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Studies on the Terrestrial Isopod Crustaceans in Japan*

II. Taxonomy of the Family Scyphacidae*

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日本産陸棲等脚目甲殻類の研究 II. ウミベワラジムシ科の分類

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第II報では、海浜域にのみ見られるグループである^{ウミベ}ワラジムシ科に属する12種についてその種名を決定し、記載を行った。ウミベワラジムシ科に属する各種類のうち、琉球列島や小笠原諸島に分布する種類の中には、かなり大きな個体群を構成し、人目にふれやすいものもあるが、九州以北に分布する種は数量的にも棲所的にも限られていて、潮間帯最上部から飛沫帯にかけて分布するものが多いために、これまで土壌動物学者にも、海洋生物学者にも注目されることは少なかった。今回観察した標本は、ほとんど著者自身の採集によるものである。

本報告で扱った種は以下のとおりで、その中には10新種を含む。

ウミベワラジムシ科 (新称)	Scyphacidae DANA, 1852
ハマベワラジムシ属 (新称)	<i>Detonella</i> LOHMANDER, 1927
ハマベワラジムシ (新称)	<i>Detonella japonica</i> , n. sp.
ハマワラジムシ属	<i>Armadilloniscus</i> ULJANIN, 1875
ニホンハマワラジムシ (新称)	<i>Armadilloniscus japonicus</i> , n. sp.
ホシカワハマワラジムシ (新称)	<i>Armadilloniscus hoshikawai</i> , n. sp.
ハナヒロハマワラジムシ (新称)	<i>Armadilloniscus brevinaseus</i> , n. sp.
シロハマワラジムシ (新称)	<i>Armadilloniscus albus</i> , n. sp.
アマクサハマワラジムシ (新称)	<i>Armadilloniscus amakusaensis</i> , n. sp.
タマワラジムシ属	<i>Alloniscus</i> DANA, 1856
ニホントマワラジムシ (新称)	<i>Alloniscus balssi</i> (VERHOEFF), 1928
オガサワラタマワラジムシ (新称)	<i>Alloniscus boninensis</i> , n. sp.
ツシマタマワラジムシ (新称)	<i>Alloniscus tsushimaensis</i> , n. sp.
リュウキュウタマワラジムシ (新称)	<i>Alloniscus ryukyuensis</i> , n. sp.
マダラタマワラジムシ (新称)	<i>Alloniscus maculatus</i> , n. sp.
タマワラジムシの一種	<i>Alloniscus</i> sp.

* Contributions from the Toyama Science Museum No. 32

Family Scyphacidae DANA, 1852

(Jap. name : Umibe-warajimushi-ka, new)

Body oval, pleon not abruptly narrower than peraeonal somites. Second antenna with 4-segmented flagellum, which sometimes appears as if it were 3-segmented. Mandible with reduced processus molaris, formed as a low base and a tuft of setae. Maxilliped with lobe acutely produced; palp elongate with segments large and indistinctly defined. Lacking glandular pore on epimera. Peraeopods with dactylus organ. Penes and first pleopod in male are each of primitive type. Pleopods without pseudotracheae. Uropod extending beyond the tip of the pleonal somites; inner branch inserted at the upper inner angle of the basal segment. Littoral on habitat.

Key to the genera of the Family Scyphacidae in Japan

- 1 Body convex. Flagellum of second antenna apparently 3-segmented usually
..... Genus *Alloniscus*
- 1' Body flat or elongated. Flagellum of second antenna always 4-segmented, or more than 4-segmented. 2
- 2 Body flat. Uropod not protruded. Cephalon with 2 concavities on anterior margin
..... Genus *Armadilloniscus*
- 2' Body elongated. Uropod with protruded lami posteriorly. Cephalon normal
..... Genus *Detonella*

Genus *Detonella* LOHMANDER, 1927

(Jap. name : Hamabe-warajimushi-zoku, new)

Body oval-lanceolate. Dorsal surface more or less obscurely tuberculate. Antennal flagellum 4-segmented. Cephalon with lateral lobes semicircular. Pleotelson produced between the protopodites of the uropods in a broad lobe, and with the sides broadly sinuate. Uropoan exopodite a little longer than and about twice as broad as the endopodite. Habitat is restricted to the moist sand under debris in the upper tidal zone.

***Detonella japonica*, n. sp.**

(Jap. name : Hamabe-warajimushi, new)

Fig. 31

Material examined : 3 ♂♂ (1 ♂ holotype, 3.9mm in body length, 2 ♂♂ paratypes, 3.3~3.6mm in body length) and 4 ♀♀ (1 ♀ allotype, 4.1mm in body length and 3 ♀♀ 3.2~5.5mm in body length), Shiri'uchi, Shiri'uchi-chô, Kamiiso-gun, Hokkaido, coll. Noboru Nunomura, June, 17, 1983; 3 ♀♀ (paratypes, 3.9~4.2mm in body length), Tôbetsu, Kamiiso-chô, Kamiiso-gun, Hokkaido, coll. Noboru Nunomura, Jun. 17, 1983; 2 ♀♀ (paratypes, 3.2~3.8mm in body length), Moheji, Kamiiso-chô, Kamiiso-gun, Hokkaido, coll. Noboru Nunomura, Jun. 17, 1983. Type series is deposited as follows: holotype (TOYA-Cr-2683), allotype (TOYA-Cr-2684) and

7 paratypes (TOYA-Cr-2685~2691) at the Toyama Science Museum, 1 paratype (OMNH-Ar-2915) at the Osaka Museum of Natural History, 1 paratype (NSMT-Cr-8974) at the National Science Museum, Tokyo and 1 paratype (YCM-CI-864) at the Yokosuka City Museum.

Description: Body somewhat oblong and oval, about 2.7 times as long as wide. Body surface with small tubercles sparsely scattered. Lateral angles of first peraeonal somite pretty acutely protruded anteriorly, while those of fourth to sixth peraeonal somites weakly protruded posteriorly. Body colour pale reddish-brown. Anterior margin of cephalon round, with anterolateral projections strong. Eyes small, each with 5~6 ocelli.

First antenna (Fig. 31 B) short; first segment stout, second segment conical with small spines on the margin, terminal segment small and round with 4 relatively long setae.

Second antenna (Fig. 31 C) reaching the posterior part of second peraeonal somite; first segment short with several short spines on outer border; second segment 1.4 times as long as wide with several short spines on outer margin; third segment almost as long as the second; fourth segment 1.7 times as long as the third and with 3 projections on inner margin; fifth segment 1.3 times as the fourth and with 6 projections on inner margin. Flagellum composed of 4 segments; first segment short; second segment 1.6 times as long as the first; third segment almost as long as the second; terminal segment nearly as long as the third, with a tuft of setae at the tip.

Right mandible (Fig. 31 D); pars incisiva composed of 3 strong teeth; lacinia mobilis not chitinized and with 3~4 teeth at the tip; 2 hairy bristles between lacinia mobilis and processus molaris; processus molaris represented by a process bearing 6 plumose setae.

Left mandible (Fig. 31 E); pars incisiva composed of 3~4 strong teeth; lacinia mobilis composed of 4 teeth; 2 hairy bristles behind lacinia mobilis; processus molaris represented by a process bearing 4 plumose setae.

First maxilla (Fig. 31 F); outer lobe ends in 9 setae, outer 4 teeth simple and recurved, inner 5 teeth bifid; inner lobe short and slender with 2 hairy bristles at the tip.

Second maxilla (Fig. 31 G) bilobed with relatively sparse setae, especially on distal part.

Maxilliped (Fig. 31 H) slender; palp with 3 shallow clefts; endite rectangular.

First peraeopod (Fig. 31 I); basis triangular; ischium rectangular; merus almost square with 4 long setae on inner margin; carpus almost as long as merus, with 4~5 long setae on inner margin; propodus rather short with a seta on inner margin and 3 setae on outer margin; dactylus with a group of dense setae at basal-outer part.

Second to sixth peraeopods are almost similar in shape; basis oblong; ischium rectangular; both merus and carpus almost 1.5 times as long as wide; propodus rectangular with a series of setae on outer margin; dactylus with a series of setae on dorsal margin.

Seventh peraeopod (Fig. 31 J); basis oblong; ischium somewhat slenderer than basis; merus triangular with 3 long and 2 short setae on inner margin and a seta at posterior distal margin; carpus rectangular with 4 setae on inner margin and fine setae on distal margin;

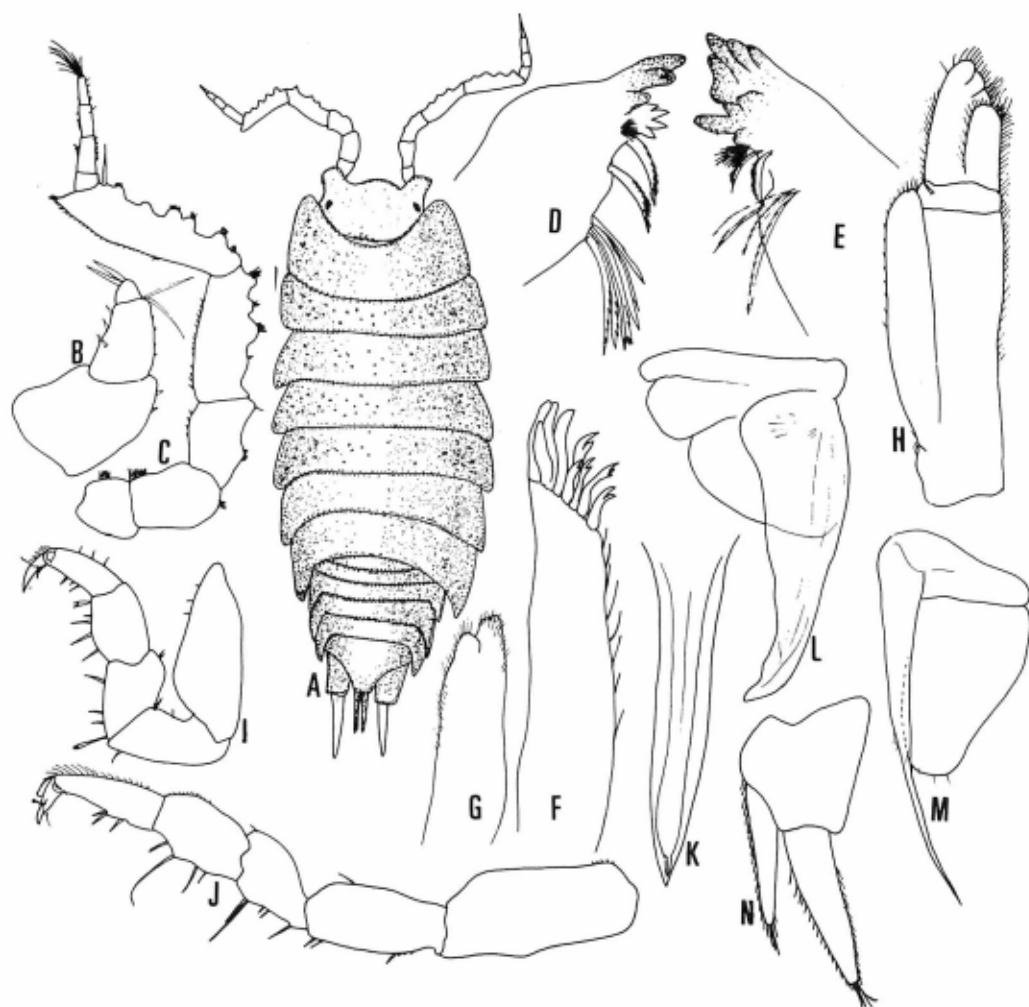


Fig. 31. *Detonella japonica*, n. sp.

A. Dorsal view; B. First antenna; C. Second antenna; D. Right mandible; E. Left mandible; F. Outer lobe of first maxilla; G. Second maxilla; H. Maxilliped; I. First pereopod; J. Seventh pereopod; K. Penes; L. Male first pleopod; M. Male second pleopod; N. Uropod. (A-F, and H-N: Holotype male, G: Allotype female).

propodus with 3 setae on inner margin and many fine setae on outer margin; dactylus with a series of setae on outer margin.

Penes (Fig. 31 K) club-shaped.

Male first pleopod (Fig. 31 L); exopodite subtriangular; endopodite rather stout and recurved outerwards in the apical part.

Male second pleopod (Fig. 31 M); exopodite ovoid with 4~7 setae on distal margin;

endopodite styliiform and tapers towards the tip.

Uropod (Fig. 31 N); basis square with slightly sinuate margin; exopodite with many spines on both inner margin and distal margin; endopodite slenderer and shorter than exopodite.

Pleotelson almost triangular, distal margin straight.

Habitat: This species was collected in the moist sand under debris in the upper tidal zone.

Remarks: The present new species is most closely allied to *Detonella sacchalina* VERHOEFF collected from Sakhalin, Kuril Islands and Kamchka Peninsula, but the former is separated from the latter in the following features: (1) shape of pleotelson, (2) invisible rudiments of fifth flagellar segment of second antenna and (3) shape of endite of maxilliped.

Genus *Armadilloniscus* ULJANIN, 1875

(Jap. name: Hama-warajimushi-zoku)

Body oval. Front outline of cephalon deeply 3-lobed. Flagellum of second antennae 4-segmented. No tracheae on the exopodite of any of the pleopods. Uropod with basal segment broad, both rami styliiform; exopodite inserted about the middle of the inner margin of the basal segment.

This genus is restricted in habitat to the upper part of tidal zone in the moist sand or under pebbles. As far as I am aware, 17 species of the genus have been known as valid from the Pacific Ocean, Indian Ocean and Atlantic Ocean.

Key to the Japanese species of the Genus *Armadilloniscus*.

- 1 Body colour reddish or brownish. Penes with a small concavity at the distal margin of genital apophysis. 2
- 1' Body colour white. Penis entire. 4
- 2 Rostral projection pointed. *A. japonicus*, n. sp.
- 2' Rostral projection truncated. 3
- 3 Body rather long about 2.1 times as long as wide. Stylus on male second pleopod with a small projection on outer border. *A. hoshikawai*, n. sp.
- 3' Body rather short, about 1.8 times as long as wide. Stylus on male second pleopod without any projection. *A. brevinaseus*, n. sp.
- 4 Body short, less than 1.7 times as long as wide. Posterior end of pleotelson round
..... *A. albus*, n. sp.
- 4' Body rather long, more than 2.0 times as long as wide. Posterior end of pleotelson truncated. *A. amakusaensis*, n. sp.

Armadilloniscus japonicus, n. sp.

(Jap. name : Nihon-hama-warajimushi, new)

Figs. 32 and 33

Material examined: 12 ♂♂ (1 ♂ holotype, 4.6 mm in body length, 11 ♂♂ paratypes, 4.1 ~5.2 mm in body length) and 16 ♀♀ (1 ♀ allotype, 4.5 mm in body length, 15 paratypes, 2.3 ~5.5 mm in body length), Sakurajima-machi, Kagoshima-gun, Kagoshima Pref., coll. Noboru Nunomura, June 30, 1974; 15 exs, Yoshimi, Shimonoseki City, Yamaguchi Pref., coll. Noboru Nunomura, Sep. 25, 1983; 6 exs, Sujigahama, Shimonoseki City, Yamaguchi Pref., coll. Noboru Nunomura, Sep. 25, 1983; 1 ex, Sakata, Shirahama-machi, Nishimuro-gun, Wakayama Pref. coll. Noboru Nunomura, Apr. 18, 1975; 1 ex, Sakanoura, Saiki City, Oita Pref., coll. Noboru Nunomura, Sep. 23, 1983; 10 exs, Tenjin-jima, Sashima, Yokosuka City, Kanagawa Pref., coll. Kimiyoshi Hayashi, June 24, 1983; 15 exs, Tenjin-jima Sashima, Yokosuka City, Kanagawa Pref., coll. Noboru Nunomura, Nov. 27, 1983; 4 exs, Asamushi, Aomori City, Aomori Pref., coll. Noboru Nunomura, June 13, 1983; 6 exs, Kamo, Saigō-chō, Oki-Island, Shimane Pref., coll. Noboru Nunomura, Sep. 20, 1975; 5 exs, Ryōishi, Kamaishi City, Iwate Pref., coll. Noboru Nunomura, May. 19, 1983. Type series is deposited as follows: holotype (TOYA-Cr-2692), allotype (TOYA-Cr-2693), and 12 paratypes (TOYA-Cr-2694~2705) at the Toyama Science Museum, 4 paratypes (OMNH-Ar-2920~2923) at the Osaka Museum of Natural History, 4 paratypes (NSMT-Cr-8976) at the National Science Museum, Tokyo, and 4 paratypes (YCM-CI-869~872) at the Yokosuka City Museum.

Description: Body oval, 1.8 times as long as wide. Body colour purple-brown with irregular paler patterns longitudinally. Cephalon with an acute medial process and a pair of small concavities on anterior margin. Eyes rather small, each composed of 6 ocelli. Each peraeonal somite wide and subequal in length.

First antenna (Fig. 32 B) small and composed of 2 segments; first segment square; second segment triangular, tapering towards the tip, and with several setae on the surface and an aesthetasc at the tip.

Second antenna (Fig. 32 C) reaching the posterior part of the first peraeonal somite; first segment small; second segment robust; third segment as long as the second; fourth segment 1.8 times as long as the third; fifth segment 1.5 times as long as the fourth. Flagellum 4-segmented, terminal segment with a tuft of setae at the tip.

Right mandible (Fig. 32 D); pars incisiva composed of 3 stout segments; lacinia mobilis not chitinized and 5~6 headed, 2 hairy bristles behind lacinia mobilis; processus molaris represented by a process bearing a tuft of long setae.

Left mandible (Fig. 32 E); pars incisiva composed of 3 stout setae; lacinia mobilis composed of 3 teeth; 3 hairy bristles between lacinia mobilis and processus molaris; processus molaris represented by a process bearing a tuft of long setae.

First maxilla (Fig. 32 F); inner lobe short with 2 hairy bristles at the tip; outer lobe stout and with a simple, 3 serrated and 3 stout setae at the tip, and a tuft of many setae at the outer

distal corner.

Second maxilla (Fig. 32 G) partly divided into 2 lappets.

Maxilliped (Fig. 32 H); endite trapezoid, and weakly bilobed; palp triangular and composed of a basal segment and a remaining part with 2 weak incisions.

First to sixth pereopods (Fig. 33 A-E) subequal in shape; basis oblong; ischium rectangular with a series of setae on inner margin; merus almost square with a series of setae

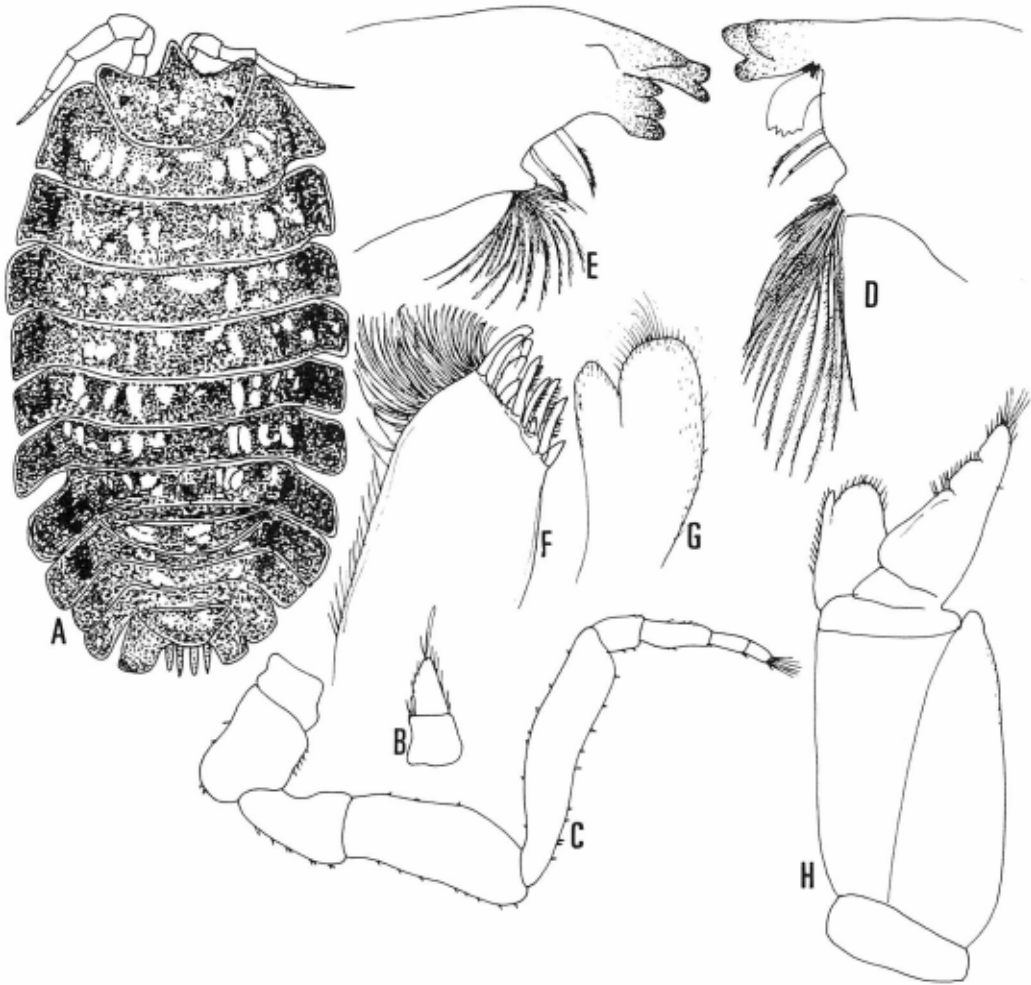


Fig. 32. *Armadilloniscus japonicus*, n. sp.

A. Dorsal view; B. First antenna; C. Second antenna; D. Right mandible; E. Left mandible; F. Outer lobe of first maxilla; G. Second maxilla; H. Maxilliped (A-C, H: Paratype male, D-G: Holotype male).

and 2~5 long setae on inner margin ; carpus almost square with a long seta on inner margin ; propodus with a series of spines ; dactylus stout.

Seventh paeopod (Fig. 33 F) ; basis fusiform with 6 small setae on inner margin ; ischium rectangular with 3 setae and many small setae on inner margin and a dozen setae on

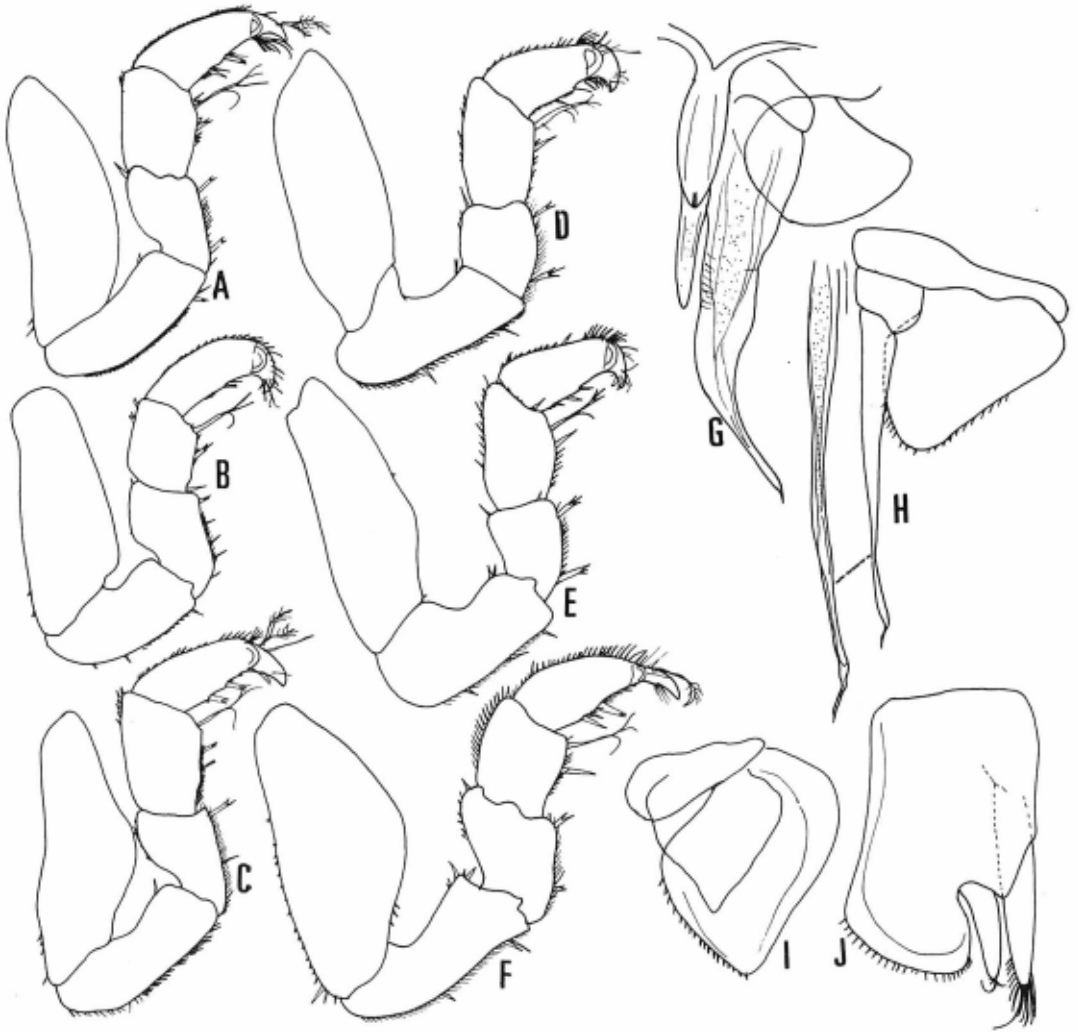


Fig. 33. *Armadilloniscus japonicus*, n. sp.

A-D. First to fourth pereopods ; E-F. Sixth to seventh pereopods ; G. Penes and male first pleopod ; H. Male second pleopod ; I. Third pleopod ; J. Uropod (A-F : Holotype male, G-J : Paratype male).

outer margin; merus square with 3~4 setae and many hairs on inner margin and about 6 setae on outer margin; carpus square with 2 setae and a long seta on inner margin; dactylus stout.

Penes (Fig. 33 G) long; buckler lanceolate; genital apophysis styliform.

Male first pleopod (Fig. 33 G); endopodite long and recurving outerwards and tapering towards the tip.

Male second pleopod (Fig. 33 H); stylus long and 2-segmented; basal segment short but terminal segment long and tapering toward the tip.

Third pleopod (Fig. 33 I) triangular and with a row of setae on inner margin. Fourth and fifth pleopods triangular with many setae on whole margin.

Uropod (Fig. 33 J); basis rectangular; endopodite slightly longer than the exopodite: each with a tuft of setae at the tip.

Pleotelson round and low.

Remarks: The present new species is most closely allied to *Armadilloniscus tuberculatus* from North America, but the former is separated from the latter in the following features: (1) smaller eyes, (2) longer palp of maxilliped; (3) shape of second antenna, (4) shorter cephalon, and (5) broader body shape.

Hitherto, the Japanese specimens referred to the genus *Armadilloniscus* have all erroneously been identified as *A. tuberculatus*.

***Armadilloniscus hoshikawai*, n. sp.**

(Jap. name: Hoshikawa-hama-warajimushi, new)

Figs. 34 and 35

Material examined: 2 ♂♂ (1 ♂ holotype, 3.4 mm in body length, 1 ♂ paratype, 3.3 mm in body length) and 5 ♀♀ (1 ♀ allotype, 4.5 mm in body length, 4 ♀♀ paratypes, 3.7~4.8 mm in body length. Komesu, Itoman City, Okinawa Island, Okinawa Pref., coll. Hiroshi Hoshikawa, May 10, 1980. Type series is deposited as follows: holotype (TOYA-Cr-2777), allotype (TOYA-Cr-2778) and 2 paratypes (TOYA-Cr-2779~2780) at the Toyama Science Museum, 1 paratype (OMNH-Ar-2926) at the Osaka Museum of Natural History, 1 paratype (NSMT-Cr-8979) at the National Science Museum, Tokyo and 1 paratype (TCM-CI-875) at the Yokosuka City Museum.

Description: Body oval, twice as long as wide. Body colour pale brown in alcohol with many paler irregular patterns on dorsal surface. Cephalon short; medial process trapezoid; lateral lobe well developed; central part ridged roundly. Mutual length of peraeonal somites subequal. Pletelson short and round. Eyes small, each eye with 6 ocelli.

First antenna (Fig. 34 B) short; first segment short; second segment big and square; terminal segment rectangular with a big seta and 2 aesthetascs at the tip.

Second antenna (Fig. 34 C) reaching the posterior margin of the first peraeonal somite; first segment short; second and third segments rectangular with 4 spines; fourth smegment

about twice as long as the third and pretty robust; fifth segment 1.5 times as long as the fourth. Flagellum composed of 4 segments, each with many hairs and terminal segment with many setae at the tip.

Righth mandible (Fig. 34 D); pars incisiva composed of 4 teeth; lacinia mobilis chitnized and 3-headed; 2 hairy bristles behind lacinia mobilis; processus molaris represented by a small process bearing a tuft of setae.

Left mandible (Fig. 34 E); pars incisiva composed of 4 teeth; lacinia mobilis chitinized and composed of 3 teeth; 4 hairy bristles behind lacinia mibilis; processus molaris represented by a small process bearing a tuft of plumose setae.

First maxilla (Fig. 34 F-G); outer lobe bearing 3 short setae, 4 simple teeth and 4 pectinate teeth at the tip; inner lobe slender and with 2 plumose setae at the tip.

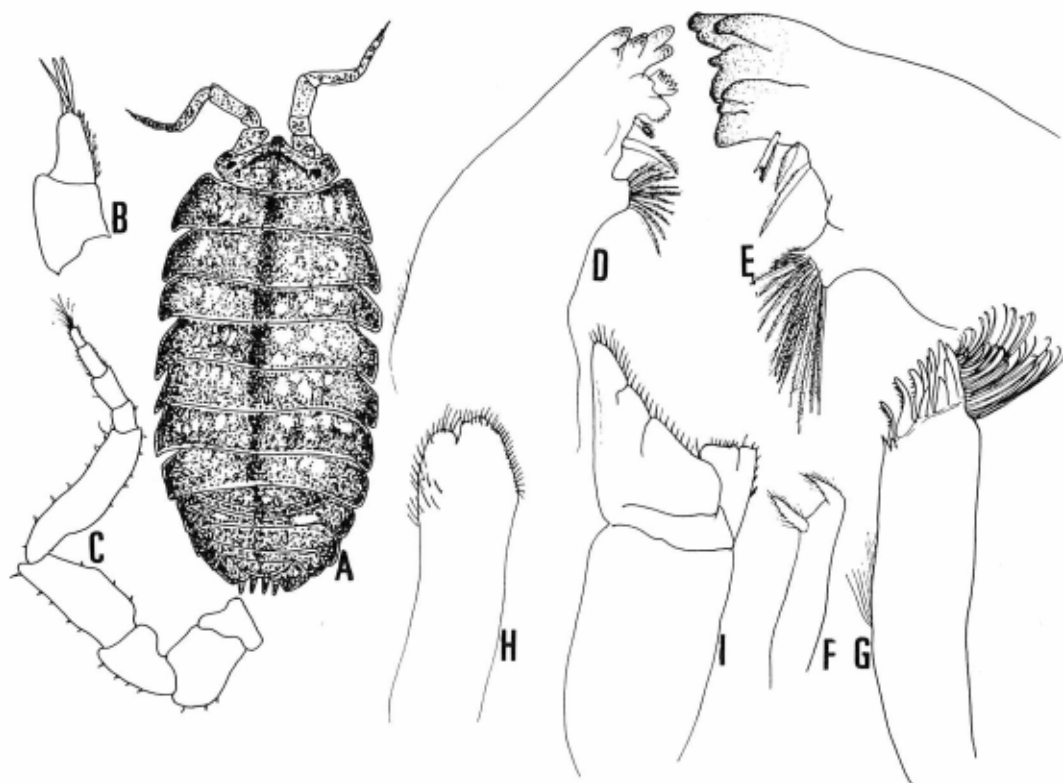


Fig. 34. *Armadilloniscus hoshikawai*, n. sp.

A. Dorsal view; B. First antenna; C. Second antenna; D. Right mandible; E. Left mandible; F. Inner lobe of first maxilla; G. Outer lobe of the first maxilla; H. Second maxilla; I. Maxilliped (All: Holotype male).

Second maxilla (Fig. 34 H) weakly bilobed.

Maxilliped (Fig. 34 I); endite truncated with several short setae on both inner and distal margins; palp triangular and its demarcation of each segment is indistinct.

First peraeopod (Fig. 35 A); basis rectangular; ischium rectangular with a series of setae on inner margin; merus rectangular, 1.3 times as long as broad with a series of 13~14 setae on inner margin; carpus rectangular, 1.2 times as long as broad with a long seta and a few shorter setae on inner margin and 6~7 setae on outer margin; propodus rectangular with a series of setae on inner margin and a series of shorter setae on outer margin.

Second peraeopod (Fig. 35 B); basis rectangular, 2.2 times as long as broad; ischium oblong, 3 times as long as broad, with a series of setae on inner margin; merus square; carpus square with a longer and a shorter setae on inner margin; propodus rectangular with 3 longer setae on inner margin and 4~5 spines and a group of setae on outer margin.

Third and fourth peraeopods (Fig. 35 C-D) subequal; basis rectangular, 2.3 times as long as broad ischium rectangular, 2.5 times as long as broad and with a series of setae on inner margin; merus rectangular, 1.2 times as long as broad; carpus square with a long seta on inner margin and with a series of setae on inner margin; propodus with a series of setae on outer margin and with 2~3 setae on inner margin.

Fifth to seventh peraeopods (Fig. 35 E-G) subequal; basis rectangular; outer part somewhat swollen; ischium rectangular with a series of setae on inner margin; merus square with a series of setae on inner margin; carpus rectangular with a long seta and 2 setae on inner margin and with 8~9 setae on outer margin; propodus with a series of setae on outer margin; dactylus rather slender.

Penes (Fig. 35 H) fusiform.

Male first pleopod (Fig. 35 H); exopodite round; endopodite with a triangular projection on outer margin, apical part recurved outwards.

Male second pleopod (Fig. 35 I); stylus long and tapering towards the tip; apical part slightly recurving outwards.

Uropod (Fig. 35 J); basis broad with many spines on outer margin; exopodite styliform but rather short, bearing 6~7 setae at the tip; endopodite longer than the exopodite with 8~10 setae at the tip.

Remarks: The present new species is closely allied to *Armadilloniscus japonicus* already described in this paper, but the former is separated from the latter in the following features: (1) longer body shape, (2) shape of rostral projection of cephalon, (3) shape of penes, and (4) shape of male first pleopod.

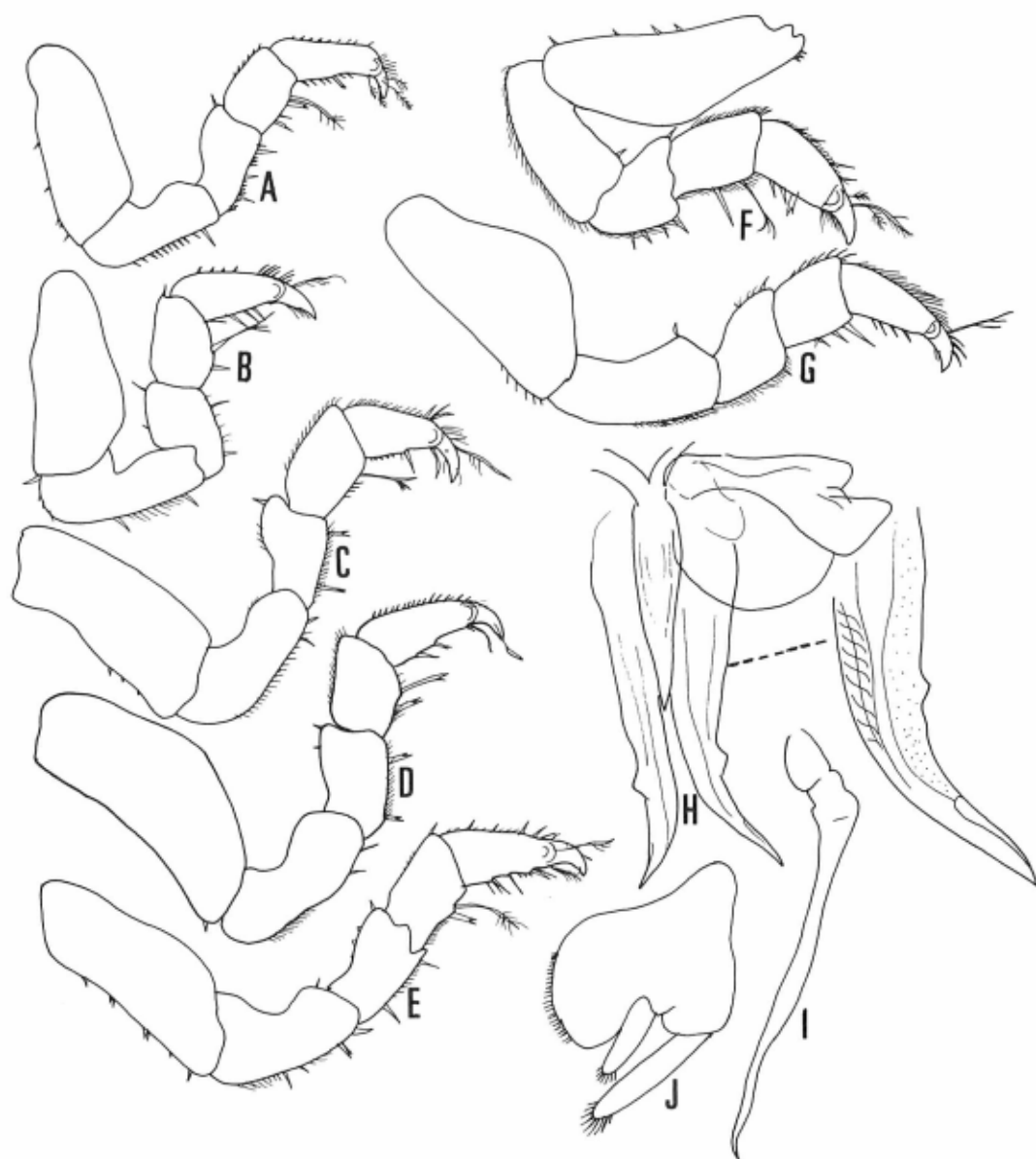


Fig. 35. *Armadilloniscus hoshikawai*, n. sp.

A-G. First to seventh pereopods; H. Penes and male first pleopod; I. Stylus on male second pleopod; J. Uropod (All: Holotype male).

***Armadilloniscus brevinaseus*, n. sp.**

(Jap. name : Hanabiro-hama-warajimushi, new)

Figs. 36 and 37

Material examined ; 2 ♂♂ (1 ♂ holotype, 4.2 mm in body length, 1 ♂ paratype, 3.1 mm in body length) , Tagura-zaki, Wakayama City, Wakayama Pref., coll. Noboru Nunomura, Apr. 2, 1976. Type series is deposited as follows : holotype (TOYA-Cr-2773), allotype (TOYA-Cr-2774) and 2 paratypes (TOYA-Cr-2775~2776) and the Toyama Science Museum, 1 paratype (OMNH-Ar-2925) at the Osaka Museum of Natural History, 1 paratype (NSMT-Cr-8978) at the National Science Museum, Tokyo and 1 paratype (TCM-CI-874) at the Yokosuka City Museum.

Description : Body flat and oval, 1.8 times as long as wide. Body colour pale reddish brown. Cephalon with broad trapezoidal rostral projection. Eyes midiocre, each with 6 ocelli. First peraeonal somite longer than the succeeding six segments.

First antenna (Fig. 36 B) 2-segmented ; first segment square with a group of setae ; terminal segment with 5 aesthetascs at the tip.

Second segment (Fig. 36 C) reaching the posterior part of first peraeonal somite. Peduncle 5-segmented ; first and second segments small and triangular ; third segment drum-shaped ; fourth segment oblong, 3.7 times as long as broad ; fifth segment very long, 5.2 times as long as broad, its basal part narrow. Flagellum 4-segmented ; terminal segment with a tuft of setae at the tip.

Right mandible (Fig. 36 D) ; pars incisiva composed of 4 teeth ; lacinia mobilis not chitinized, consisting of a single tooth ; 2 hairy bristles behind lacinia mobilis ; processus molaris represented by a subcylindrical process bearing about 25 relatively short plumose setae.

Left mandible (Fig. 36 E) ; pars incisiva composed of 3 teeth ; lacinia mobilis ends in 2 teeth ; a hairy bristle behind lacinia mobilis ; processus molaris represented by a subcylindrical process bearing about 25 relatively short plumose setae.

First maxilla (Fig. 36 F) ; outer lobe with 11 teeth at the tip, 4 of which are pectinate, and many long setae at outer distal corner.

Second maxilla (Fig. 36 G) divided into 2 lobes indicated by a shallow groove.

Maxilliped (Fig. 36 H) ; endite rectangular, bearing setae scattered sparsely.

Palp triangular ; first segment much wider than long, segmentation of each segment indistinct, bearing a group of setae especially at distal part. Epipodite small.

First peraeopod (Fig. 37 A) ; basis stout and rectangular ; ischium rectangular with 3 spines on inner margin ; merus somewhat longer than broad, with a spines on inner margin and 2 setae on outer margin ; carpus almost square with a long sensory seta and 2 simple setae on inner margin and 3 setae on outer margin ; propodus rectangular with 12 setae on inner margin and 12 setae on outer margin ; dactylus stout.

Second to seventh peraeopods (Fig. 37 B-E) subequal ; basis oblong, 2.6 times as long as

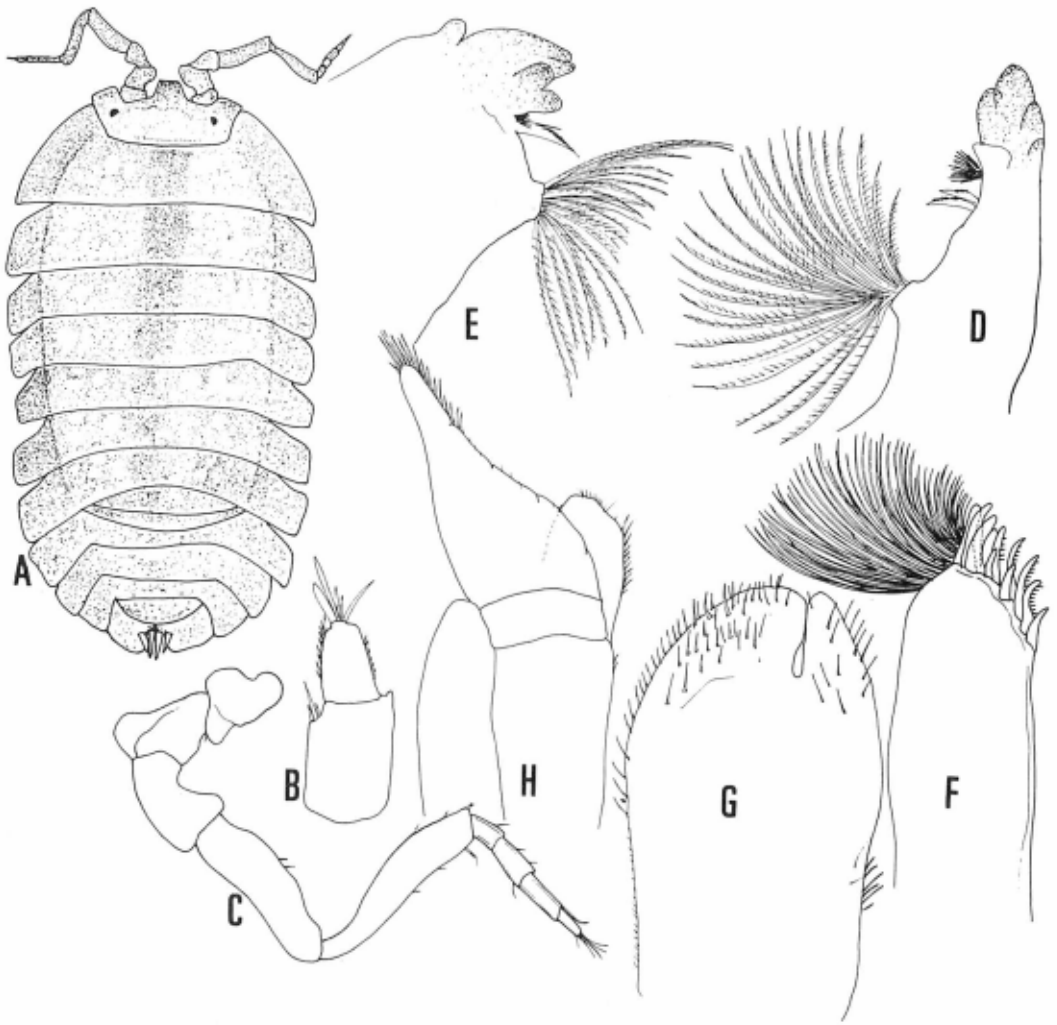


Fig. 36. *Armadilloniscus brevinaseus*, n. sp.

A. Dorsal view ; B. First antenna ; C. Second antenna ; D. Right mandible ; E. Left mandible ; F. Outer lobe of first maxilla ; G. Second maxilla ; H. Maxilliped (A, D, E and G : Allotype female ; B-C, F and H ; Holotype male)

wide ; ischium rectangular, 2.7 times as long as wide with 9 setae on inner margin ; merus rectangular, 1.7 times as long as wide, with 4 setae and about 20 hairs on inner margin ; carpus rectangular, 1.7 times as long as wide with a very long seta and 4~6 setae on inner margin ; propodus rectangular ; dactylus stout.

Penes (Fig. 37 F) fusiform.

First pleopod (Fig. 37 F) recurved outerwards, tapering towards the tip.

Male second pleopod (Fig. 37 G) ; stylus very long and tapering towards the tip.

Uropod (Fig. 37 H) ; basis broad ; endopodite somewhat longer than the exopodite ; each with a tuft of setae at the tip. Pleotelson low and round.

Remarks : The present new species is closely allied to *Armadilloniscus hoshikawai*

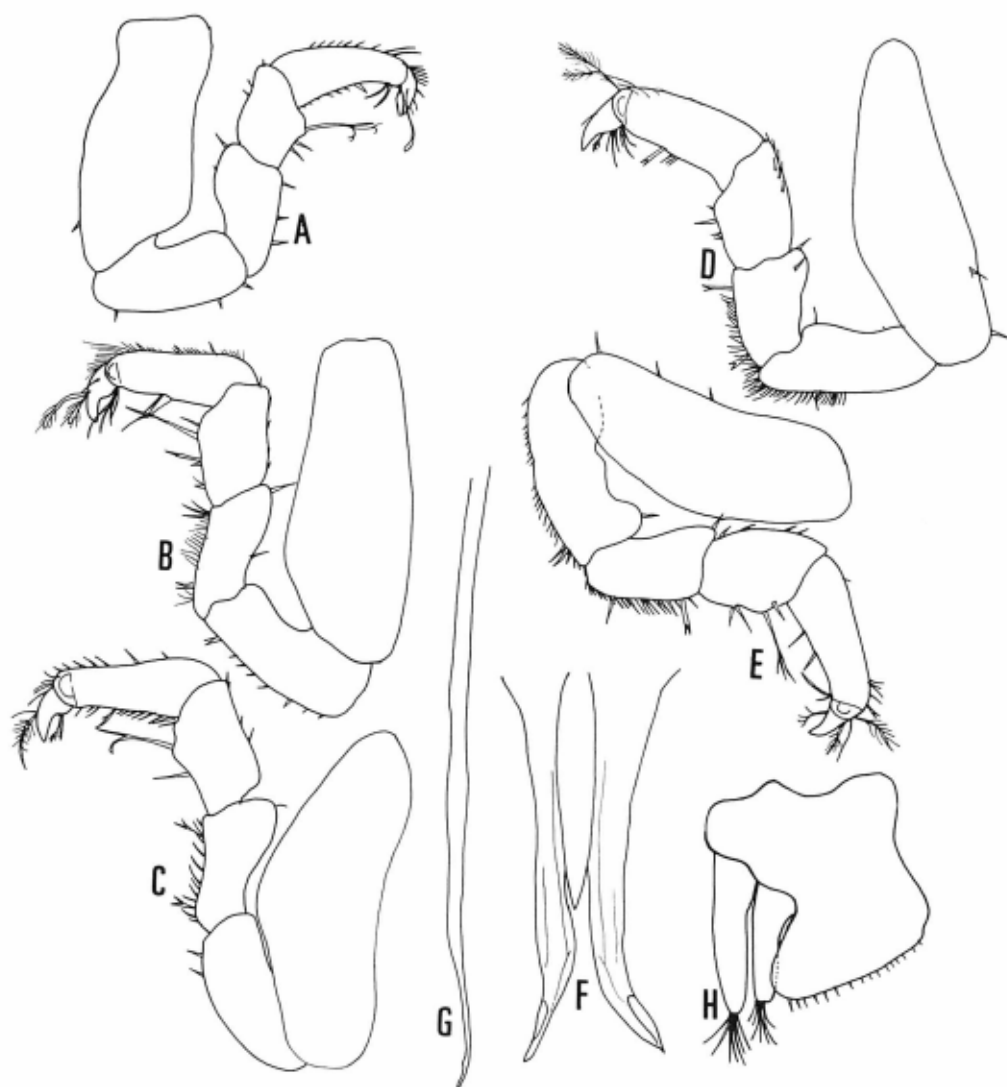


Fig. 37. *Armadilloniscus brevinaseus*, n. sp.

A-C. First to third pereopods ; D-E. Fifth to sixth pereopods ; F. Penes and male first pereopod ; G. Stylus on male second pleopod ; H. Uropod (All : Holotype male)

described in this paper. But the former is separated from the latter in the following features : (1) broader rostral projection of cephalon, (2) robust peraeopods, (3) lack of triangular projection on male first pleopod.

***Armadilloniscus albus* n. sp.**

(Jap. name : Shiro-hama-warajimushi, new)

Figs. 38 and 39

Material examined: 3 ♂♂ (1 ♂ holotype, 3.5 mm in body length, 2 ♂♂ paratypes, 2.7~5.0 mm in body length) and 4 ♀♀ (1 ♀ 7.2 mm in body length and 3 ♀♀ paratypes, 3.7~5.8 mm in body length), in the moist pebbles of the upper part of tidal zone, Nagamatsu, near Nagasaki, Misaki-chō, Sennan-gun, Osaka Pref. coll. Noboru Nunomura, Nov. 18, 1975. Type series is deposited as follows: holotype (TOYA-Cr-2769), allotype (TOYA-Cr-2770) and 2 paratypes (TOYA-Cr-2771~2772) at the Toyama Science Museum, 1 paratype (OMNH-Ar-2924) at the Osaka Museum of Natural History, 1 paratype (NSMT-Cr-8977) at the National Science Museum, Tokyo, 1 paratype (YCM-CI-873) at the Yokosuka City Museum.

Description: Body flat and broad, 1.4 times as long as wide. Body colour white.

Cephalon short; rostral projection triangular, broad but low.

All the peraeonal somites subequal in length.

First antenna (Fig. 38 B) 2-segmented; first segment square; second segment rectangular with 4~6 setae on apical border.

Second antenna (Fig. 38 C) reaching the middle part of the first peraeonal somite; first segment short with a protruded projection; second segment rectangular; third segment almost similar to the second; fourth segment broad; fifth segment long, 1.5 times as long as the fourth; flagellum 4-segmented with a tuft of setae at the tip.

Right mandible (Fig. 38 D) pars incisiva composed of 3 teeth; lacinia mobilis with 10 teeth at the tip; a hairy bristle between lacinia mobilis and processus molaris; processus molaris represented by a process bearing a tuft of relatively short plumose setae.

Left mandible (Fig. 38 E); pars incisiva composed of 4 teeth; lacinia mobilis ends in 2 setae; 2 hairy bristles behind the lacinia mobilis; processus molaris represented by a process with a tuft of long plumose setae.

First maxilla (Fig. 38 F); outer lobe with a small seta, 4 pectinate setae and 4 simple setae at the tip; and with a group of setae at outer distal corner.

Maxilliped (Fig. 38 H); endite with a shallow concavity at the tip; palp triangular and composed of a distinct basal segment and 3 indistinct segments; epipodite small and lanceolate.

All the peraeopods (Fig. 39 A-G) almost similar in shape; basis oblong; ischium rectangular with a series of setae on inner margin; merus square with a series of setae on inner margin and a seta at outer distal part; carpus rectangular with a longer and several

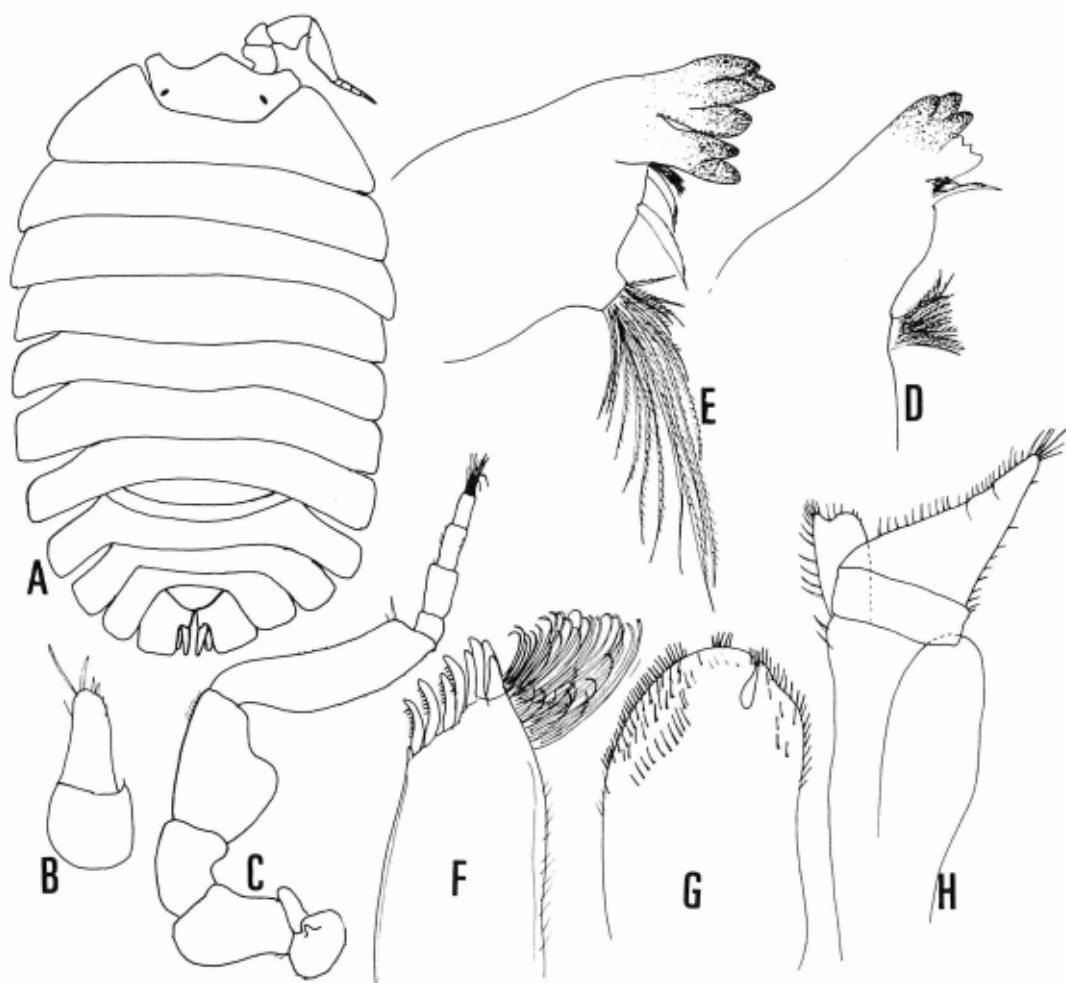


Fig. 38. *Armadilloniscus albus*, n. sp.

A. Dorsal view ; B. First antenna ; C. Second antenna ; D. Right mandible ; E. Left mandible ; F. Outer lobe of first maxilla ; G. Second maxilla ; H. Maxilliped. (A : Allotype female ; B-G : Holotype male)

shorter setae on inner margin ; dactylus short.

Penes (Fig. 39 H-I) ; buckler fusiform ; genital apophysis styliiform with a small incision at the tip.

Male first pleopod (Fig. 39 H-J) ; endopodite recurved towards the tip ; exopodite small.

Male second pleopod (Fig. 39 K) ; endopodite long and straight, tapering towards the tip.

Uropod (Fig. 39 L) ; basis large and rectangular ; endopodite styliiform with a small spines

on the margin and 2 setae at the tip; exopodite styliform and two-thirds the length of the endopodite.

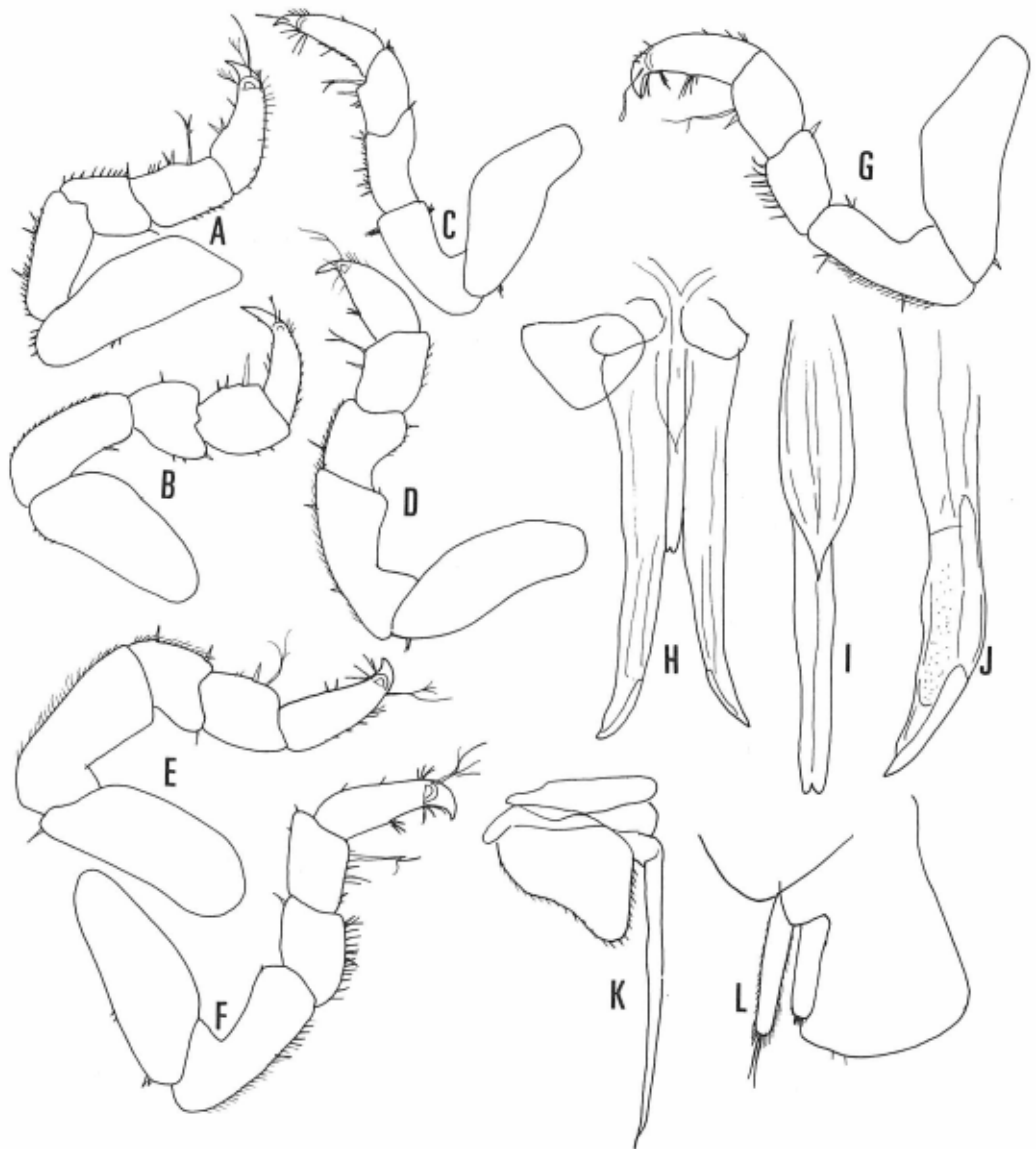


Fig. 39. *Armadilloniscus albus*, n. sp.

A-G. First to seventh pereopods; H. Penes and male first pleopod; I. Penes; J. Endopodite of male first pleopod; K. Male second pleopod; L. Uropod (All: Holotype male).

Pleotelson round and short.

Remarks: The present new species is distinguished from *Armadilloniscus japonicus* in the following features: (1) white body colour, (2) broader body shape, (3) short rostral projection, (4) shape of penes and male first pleopod and (5) shorter male second pleopod.

***Armadilloniscus amakusaensis*, n. sp.**

(Jap. name: Amakusa-hama-warajimushi, new)

Fig. 40

Materials examined: 2 ♂♂ (1 ♂ holotype, 3.1 mm in body length and 1 ♂ paratype, 1.7 mm in body length) and 1 ♀ (allotype, 3.0 mm in body length), Tomoe-zaki, Tomioka, Reihoku-chô, Kumamoto Pref., coll. Taiji Kikuchi, June 23, 1963. Type series is deposited at the Toyama Science Museum: holotype (TOYA-Cr-2781), allotype (TOYA-Cr-2782) and 1 paratype (TOYA-Cr-2783).

Description: Body oval, 1.9 times as long as broad. Body colour white in alcohol. Eyes small, composed of 6~7 ocelli. Rostral projection of cephalon low but broad; lateral angles wide. First peraeonal somite somewhat longer than the second; second to the last peraeonal somites subequal in length.

Pleotelson truncated.

First antenna (Fig. 40 C) 2-segmented; first segment big; second segment rectangular with a series of spines on both margins and 2 aesthetascs at the tip.

Second antenna (Fig. 40 D) reaching the middle part of the first peraeonal somite.

Peduncle 5-segmented; first to the third segments rectangular; fourth segment about twice as long as the third; fifth segment 1.5 times as long as the fourth; flagellum 4-segmented; terminal segment bearing a tuft of setae.

Right mandible (Fig. 40 E); pars incisiva composed of 3 teeth; lacinia mobilis not chitinized with 3 acute heads; a hairy bristle near lacinia mobilis; processus molaris represented by a process bearing a tuft of plumose setae.

Left mandible (Fig. 40 F); pars incisiva composed of 4 teeth; lacinia mobilis 2-headed; a hairy bristle behind lacinia mobilis; processus molaris represented by a process bearing a tuft of setae.

First maxilla (Fig. 40 G); outer lobe bears 8 setae at the tip, 3 of which pectinated and a group of setae at outer distal corner.

Second maxilla (Fig. 40 H); round with a small incision.

Maxilliped (Fig. 40 I); endite small; palp triangular with a indistinct segment.

All the peraeopods (Fig. 40 J-K) almost similar in shape: basis oblong; ischium rectangular; merus almost square with a series of setae on inner margin; carpus almost square with a long seta and a series of hair on outer margin; dactylus short.

Penes (Fig. 40 L); buckler lanceolate; genital apophysis styliform with a small concavity at the tip.

Male first pleopod (Fig. 40 M) ; endopodite, recurving outerwards, tapers towards the tip, and bears a small projection on outer margin.

Male second pleopod (Fig. 40 N) ; stylus long and straight.



Fig. 40. *Armadilloniscus amakusaensis*, n. sp.

A. Dorsal view; B. Cephalon; C. First antenna; D. Second antenna; E. Right mandible; F. Left mandible; G. Outer lobe of first maxilla; H. Second maxilla; I. Maxilliped; J. Sixth pereopod; K. Seventh pereopod; L. Penis; M. Male first pleopod; N. Stylus on male second pleopod; O. Uropod (A-B, E-F, H-O: Allotype female, C-D and G: Holotype male).

Uropod (Fig. 40 O) : basis broad ; endopodite styliform ; with a seta at the tip ; exopodite narrower and shorter than the endopodite.

Remarks : The present new species is most closely allied to *Armadilloniscus albus* described in this paper, but the former differs from the latter in the following features : (1)



Fig. 41. Map showing the geographical distribution of the genera *Detonella* and *Armadilloniscus*.

narrower body shape, (2) trapezoidal pleotelson, (3) shape of male first pleopod, especially presence of triangular projection on the endopodite.

Genus *Alloniscus* DANA, 1854

(Jap. name : Tama-warajimushi-zoku)

Body convex and feebly or scacely contractile. Pleon not clearly narrower than peraeon. Noduli lateralis lacking. Second antenna with 3- segmented flagellum. Epimeral part of peraeonal somites small, not much expanded. Legs very spinulose.

Key to the Japanese species of the Genus *Alloniscus*

- 1 Body elongated, more than 2.2 times as long as wide. All the teeth of the first maxilla long and entire. *A. tsushimaensis*, n. sp.
- 1' Body rather short, usually less than 2.0 times as long as wide. Some teeth of the first maxilla bifid or short. 2
- 2 First maxilla with 10 teeth on the outer lobe. Body usually yellowish. 3
- 2' First maxilla with 8~9 teeth on the outer lobe. Body blackish. 5
- 3 Eyes big, composed of more than 20 ocelli. Any poeraeopod without patterns. 4
- 3' Eyes small, composed of less than 15 ocelli. Some of the peraeopods with round black patterns on basis. *A. maculatus*, n. sp.
- 4 Pleotelson short. Peraeopods bearing numerous setae. Epimeral part of pleon shorter
..... *A. ryukyuensis*, n. sp.
- 4' Pleotelson rather long. Peraeopods bearing relatively fewer setae. Epimeral part rather longer. *A. sp.*
- 5 Body relatively long, usually 1.9 times as long as wide. Both endopodite of male first pleopod and stylus on male second pleopod extended nearly straightly
..... *A. balssi* (VERHOEFF), 1928
- 5' Body rather short, 1.7 times as long as wide. Both endopodite of male first pleopod and stylus on male second pleopods recurved outerwards. *A. boninensis*, n. sp.

***Alloniscus balssi* (VERHOEFF), 1928**

(Jap. name : Nihon-tama-warajimushi, new)

Figs. 42 to 45

Japanoniscus balssi VERHOEFF, 1928.

Alloniscus balssi (VERHOEFF), in ARCANGELI, 1965.

? *Alloniscus perconvexus* (DANA) in SHIINO, 1965.

Material examined : More than 200 specimens from various parts of central and southern Japan.

Description of the specimens from the type locality: Body rather oblong, about twice as long as wide.

All the peraeonal somites almost equal in length. Hinder-lateral margin of the first to

fourth peraeonal somites almost rectangular, but those of the fifth to seventh peraeopod acute and protruded. Body colour brackish with yellowish patterns on dorsal surface. Small granules sparsely scattered. Cephalon relatively small; rostral projection slightly protruded; lateral angle acutely protruded. Eyes mediocre with 20 ocelli.

First antenna (Fig. 42 B) small and 3-segmented; first segment stout; second segment short; terminal segment conical with 5~6 aesthetascs at the tip.

Second antenna (Fig. 42 C) reaching the posterior part of the second peraeopod; first segment small; second segment almost square; third segment rectangular, twice as long as wide; fourth segment 1.7 times as long as the third; fifth segment 1.6 times as long as the fourth. Flagellum composed of 3-segments and almost as long as the fifth peduncular segments; mutual length of each flagellar segment variable, but the majority is 1:1:2.

Right mandible (Fig. 42 D); pars incisiva composed of 4 teeth; lacinia mobilis not chitinized and consisting of a single tooth; 2 hairy bristles behind lacinia mobilis; processus molaris represented by a tuft of plumose setae set on a common basal process.

Left mandible (Fig. 42 F); pars incisiva composed of 3 teeth; lacinia mobilis composed of 3~4 teeth; 2 hairy bristles behind lacinia mobilis; processus molaris like that of right mandible.

First maxilla (Fig. 42 F); outer lobe with 8~9 teeth, 4 of which are cleft ones; inner lobe with 2 hairy bristles at the tip.

Second maxilla (Fig. 42 G); apex divided into 2 lappets and covered with many setae.

Maxilliped (Fig. 42 H); outer side of basis protruded beyond base of palp; palp with 3 groups of setae; endite subrectangular with a robust setae on inner distal angle and many fine setae.

First peraeopod (Fig. 43 A) rather short; basis rectangular with 3~5 spines on outer margin and 7 spines on inner margin; ischium rectangular with 7~8 spines on inner margin; merus with 11 setae and 6~7 spines on outer margin; carpus almost as long as merus, bearing 11 relatively long bifid setae on inner margin on inner and 2 setae and a few of spines on outer-posterior part; propodus slender with 3~4 setae and about 10 spines on inner margin and a dozen spines on outer margin; dactylus with 3~4 setae on outer margin and a seta on inner margin and a sensory seta.

Second to seventh peraeopods (Fig. 43 B-C) subequal in shape; basis rectangular with 8~9 spines on both margins; ischium rectangular with 4~8 setae on inner margin on 1~2 setae on outer margin; merus rectangular with about 10 setae on inner margin and 1~2 setae on outer distal corner; carpus rectangular with relatively long 13~16 setae on inner margin and 5~8 spines on distal corner; propodus long, with 6~7 setae on inner margin and 6~8 spines on distal corner; dactylus with a sensory seta and 3~4 setae on outer corner, and 2~3 setae on inner margin.

Penes (Fig. 42 I) fusiform.

Male first pleopod (Fig. 42 I) relatively short straight with a series of 16 spines.

Male second pleopod (Fig. 42 J); stylus rather short, slightly recurved outerwards and tapers towards the tip; exopodite triangular and with 7~8 spines on the outer distal margin.

Uropod (Fig. 42 K); basis almost square bearing about 14 short spines on outer margin and 30 short spines on inner margin; endopodite slender with 2 long setae at the tip and 5

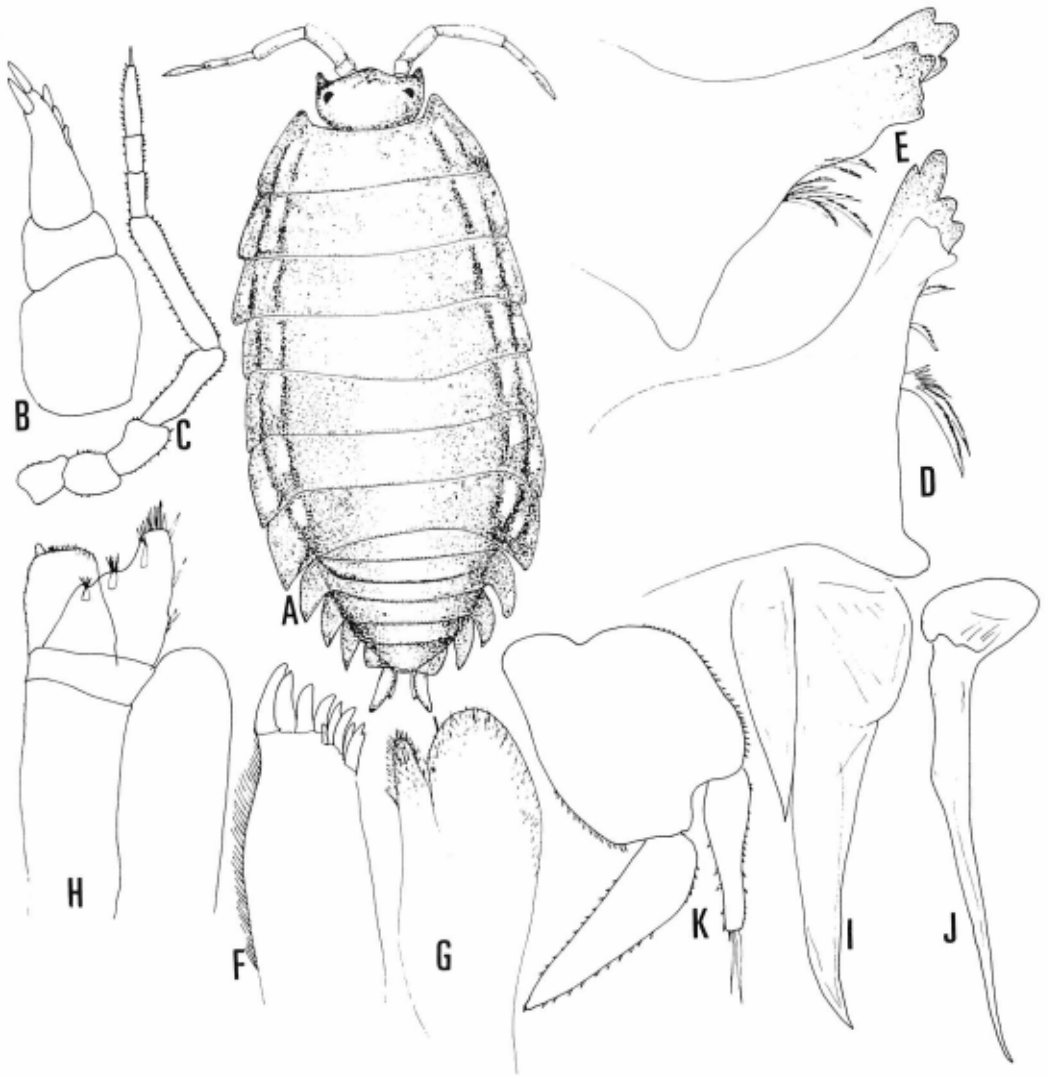


Fig. 42. *Alloniscus balssi* (VERHOEFF) collected from Miura City, type locality.

A. Dorsal view; B. First antenna; C. Second antenna; D. Right mandible; E. Left mandible; F. Outer lobe of first maxilla; G. Second maxilla; H. Maxilliped; I. Penes and endopodite of male first pleopod; J. Stylus on male second pleopod; K. Uropod (All: Male specimen).

spines on outer margin and about 8 spines on inner margin ; exopodite stouter and 1.3 times as long as the endopodite, bearing 13 spines on outer margin and 17 spines on inner margins.

Pleotelson roundly triangular.

Habitat : under the stones or in the litter in the upper part of tidal zone or the place near shore.

Type locality : Aburatsubo, Miura City, Kanagawa Prefecture, Central Japan.

Remarks : The present specimens collected from type locality and neighbouring (Yokosuka City) agree well to the Verhoeff's original description, but many of the present materials were observed to have more numerous teeth on the top of the first maxilla.

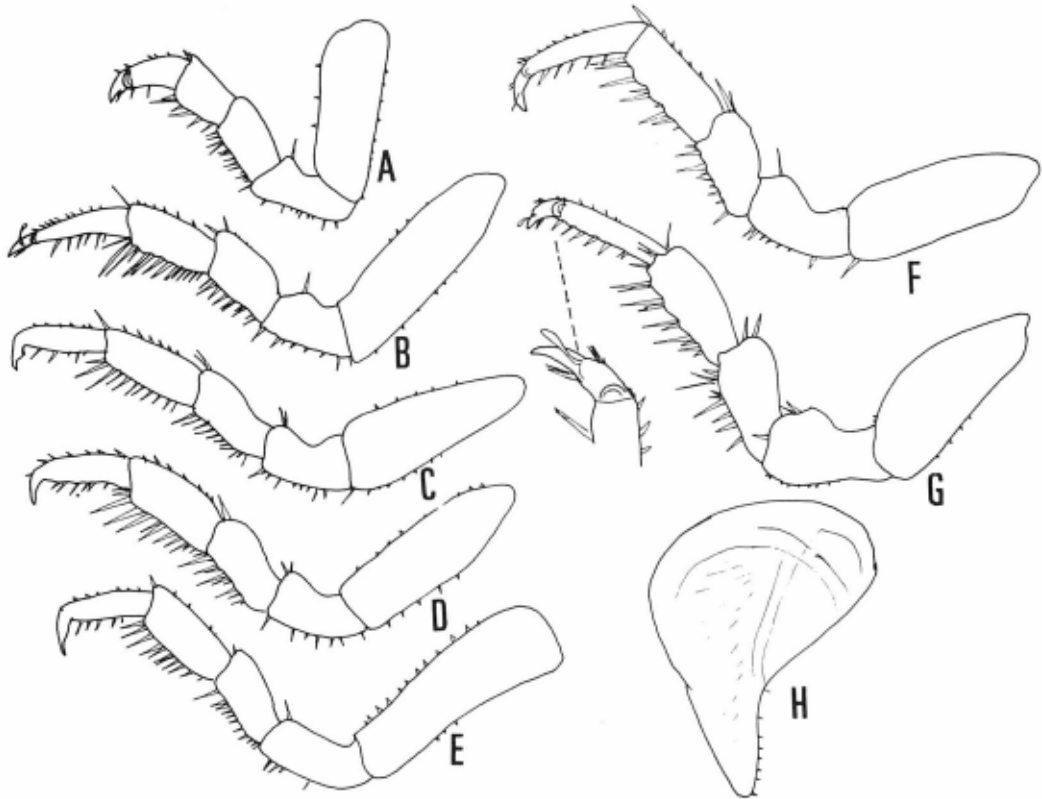


Fig. 43. *Alloniscus balssi* (VERHOEFF) collected from Miura City, type locality.

A-G. First to seventh pereopods. H. Exopodite of male first pleopod.

(All : Male specimen).

The specimens identifiable with this specimen were collected from various parts of central and southern Japan, from Niigata Prefecture (Japan Sea side) and Ibaragi Prefecture (Pacific side) southwards to Miyazaki Prefecture and Kuchinoerabu Island (Kagoshima Prefecture), and some remarkable characters were found among them as follows: (1) specimens from place other than the type locality and Kantô District are robuster in body form, (2) specimens from Wakayama Prefecture are more blackish, while those from the Japan Sea side and Kyushu are paler on pleon, (3) 10 teeth, instead of 8~9, are found on the

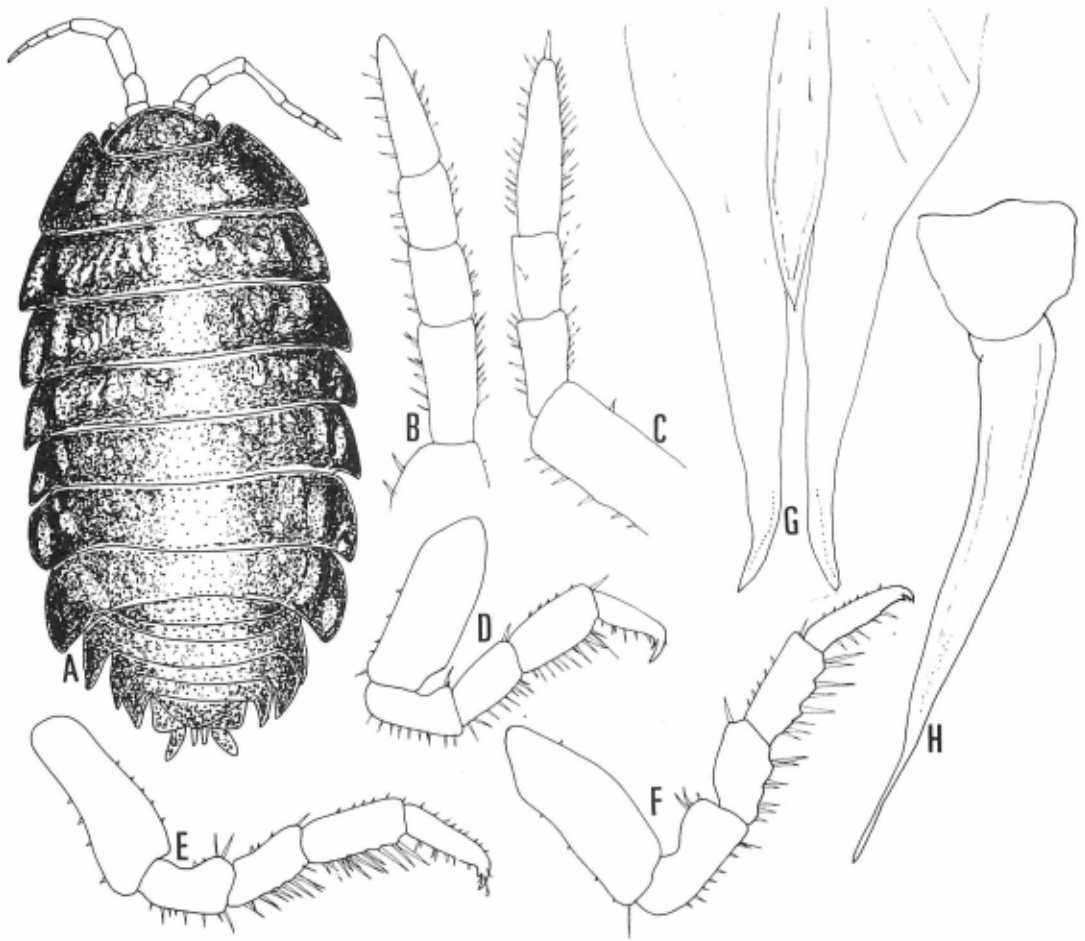


Fig. 44. *Alloniscus balssi* (VERHOEFF) collected from Wakayama City.

A. Dorsal view; B. Flagellum of second antenna of 4-segmented type; C. Flagellum of 3-segmented type; D. Second pereopod; E-F. First and sixth pereopods; G. Penes and male first pleopod; H. Stylus on male second pleopod (All: Male specimens).

first maxilla in specimens from Toyama Prefecture and Wakayama Prefecture, (4) first antennal flagellum is 4-segmented, instead of 3-segmented, in some specimens from Tomogashima, Wakayama Prefecture. The last variation type, in particular, seems to be very significant, because the flagellar segmentation is considered as an essential taxonomic feature; these specimens, however, collected together with the normal 3-segmented type specimens.

As mentioned above, the present species includes many variation types, but they could not

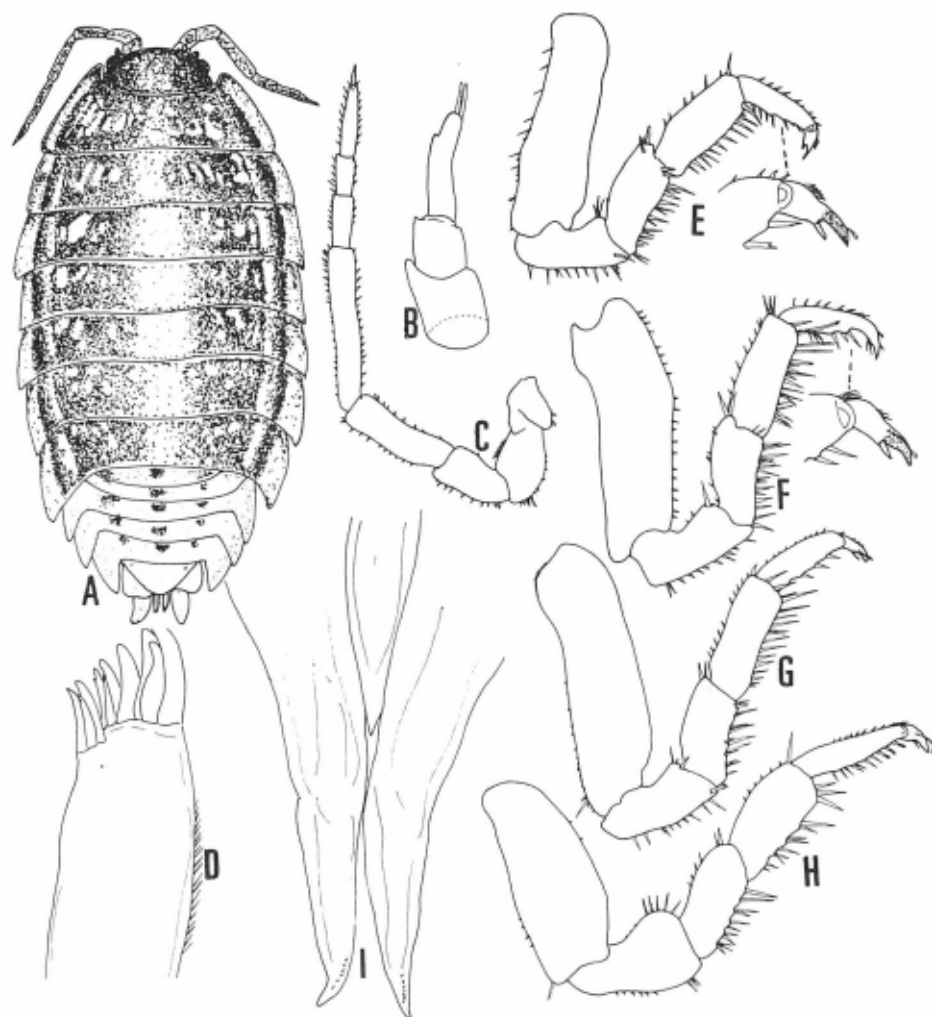


Fig. 45. *Alloniscus balssi* (VERHOEFF) collected from Takaoka City.

A. Dorsal view; B. First antenna; C. Second antenna; D. Outer lobe of first maxilla; E-G. Second to fourth pereopods; H. Seventh pereopod; I. Penes and male first pereopod (All: Male specimens).

be divided into distinct species or subspecies, in that different types are often collected from a single locality.

***Alloniscus boninensis*, n. sp.**

(Jap. name : Ogasawara-tama-warajimushi, new)

Figs. 46 and 47

Material examined: 2 ♂♂ (1 ♂ holotype, 8.3 mm in body length, 1 ♂ paratype, length unknown) and 3 ♀♀ (1 ♀ allotype, 10.0 mm in body length, 2 ♀♀ paratypes, 8.9~9.5 mm in body length), Kuwanokiyama, *Bischofia javanica* forest, 260 m in altitude Hahajima Island, Bonin Island, coll. Junichi Aoki and Hiroshi Harada June 24, 1977; 1 ♂ (paratype, 8.8 mm in body length), Sekimon-zan, Haha-jima Island, Bonin Island, coll. Junichi Aoki and Hiroshi Harada, June 24, 1977; 1 ♂ (paratype, 8.2 mm in body length) between Kuwanokiyama-Sakaigake, Hahajima-Island, Bonin Island, coll. Junichi Aoki and Hiroshi Harada, June 24, 1977; 1 ♂ (paratype, 7.7 mm in body length), south of Yoakeyama, Chichijima Island, Bonin Islands, coll. Junichi Aoki and Hiroshi Harada, July 1, 1977. Type series is deposited as follows: holotype (TOYA-Cr-2365), allotype (TOYA-Cr-2366), 4 paratypes (TOYA-Cr-2367~2370) at the Toyama Science Museum, 1 paratype (OMNH-Ar-2909) at the Osaka Museum of Natural History, 1 paratype (NSMT-Cr-8972) at the National Science Museum, Tokyo.

Description: Body oval, 1.7 times as long as wide. Body colour pale brown with irregular patterns of darker colour, particularly distinct dark brown area on each posterior peraeonal somite and cephalon. Each peraeonal somite subequal in length.

First antenna (Fig. 46 B); first segment stout and square; second segment short; terminal segment tapering towards the tip and nearly 4 times as long as the second.

Second antenna (Fig. 46 C) reaching the posterior part of first peraeonal somite; first segment short and triangular; second segment rectangular with many spines on inner margin; third segment as long as the second; fourth segment about twice as long as the third; fifth segment slender, about 1.5 times as long as the fourth; mutual length of 3 flagellar segments is 2:1:2.

Right mandible (Fig. 46 D); pars incisiva composed of 3 teeth; lacinia mobilis not chitinized, consisting of a single tooth; 2 hairy bristles between lacinia mobilis and processus molaris; processus molaris represented by a tuft of plumose setae on a common process.

Left mandible (Fig. 46 E); pars incisiva composed of 3 teeth; lacinia mobilis consists of a broad tooth; 2 hairy bristles behind lacinia mobilis; processus molaris like that of right mandible.

First maxilla (Fig. 46 F); outer lobe with 9 teeth at the tip, of which 3 are bigger; inner lobe short bearing 2 hairy bristles at the tip.

Second maxilla (Fig. 46 G) stout with a shallow incision.

Maxilliped (Fig. 46 H); epipodite long; endite rectangular with a hairy bristle on inner distal corner; palp narrow, consisting of basal segment and 3 indistinct lobes.

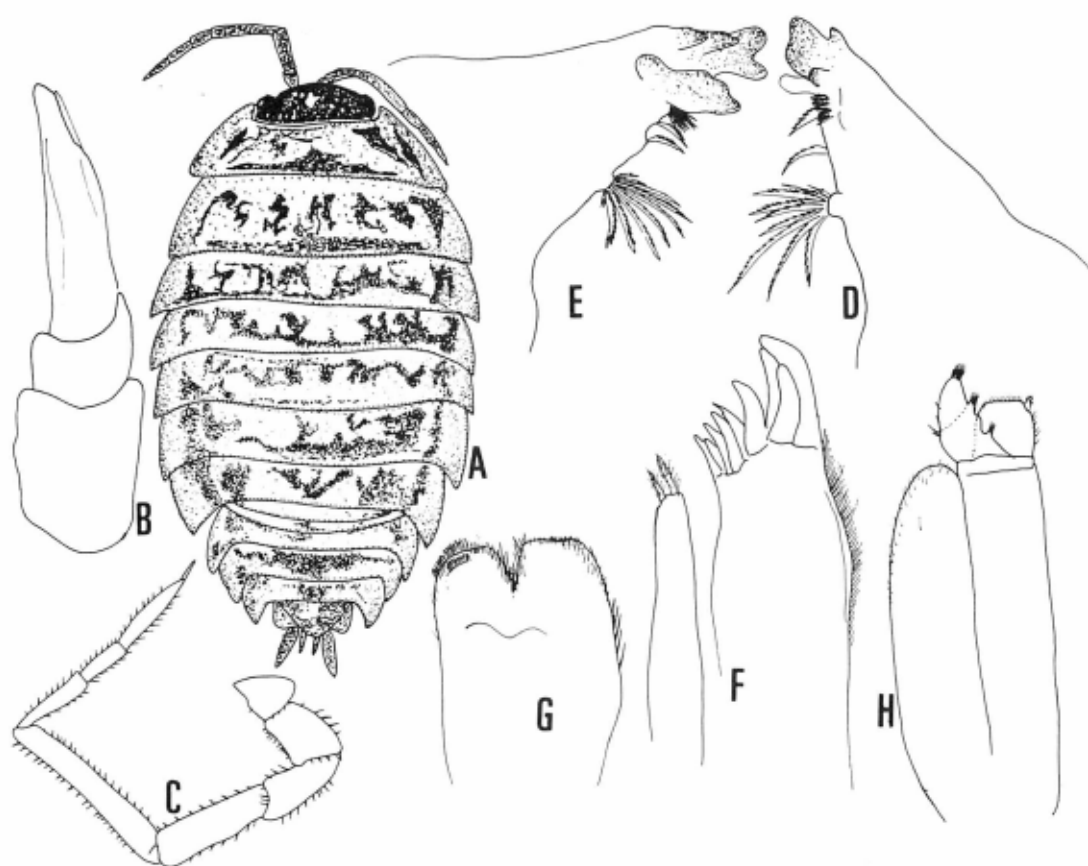


Fig. 46. *Alloniscus boninesis*, n. sp.

A. Dorsal view ; B. First antenna ; C. Second antenna ; D. Right mandible ; E. Left mandible ; F. First maxilla ; G. Second maxilla ; H. Maxilliped. (A-C, H : Holotype male, D-G : Paratype male).

All the pereopods (Fig. 47 A-F) subequal in shape ; basis oblong ; ischium rectangular with a series of setae on inner margin ; merus rectangular but a little shorter than ischium, bearing a series of setae on inner margin ; carpus as long as merus with a series of setae on inner margin ; propodus rectangular with a series of long setae on inner margin and short setae on outer margin ; propodus slender with a series of setae on inner margin and a series of shorter setae on outer margin ; dactylus with a group of short setae on outer margin.

Penes fusiform. First male pleopod (Fig. 47 G-I) ; exopodite subtriangular with 5 spines on apical part.

Male second pleopod (Fig. 47 I-J) ; stylus tapering towards the tip ; exopodite subtriangular with outer border deeply incurved and apex rather sharply rounded, bearing 23 spines on outer margin in holotype but only 3 in paratype male.

Uropod ; basis stout ; endopodite styliform and short ; exopodite fusiform.

Pleotelson triangular and forms a right angle at the tip.

Habitat : These specimens were collected from the forests of evergreen trees such as *Bischofia javanica* *Distylium lepidotum*, *Schima mertensiana* and *Pisonia umbellifera*.

Remarks : The present new species is closely allied to *Alloniscus balssi*, but the former is separated from the latter in the following features: (1) broader body shape, (2) acuter posterior margin of pleotelson, (3) shape of first peraeopod.

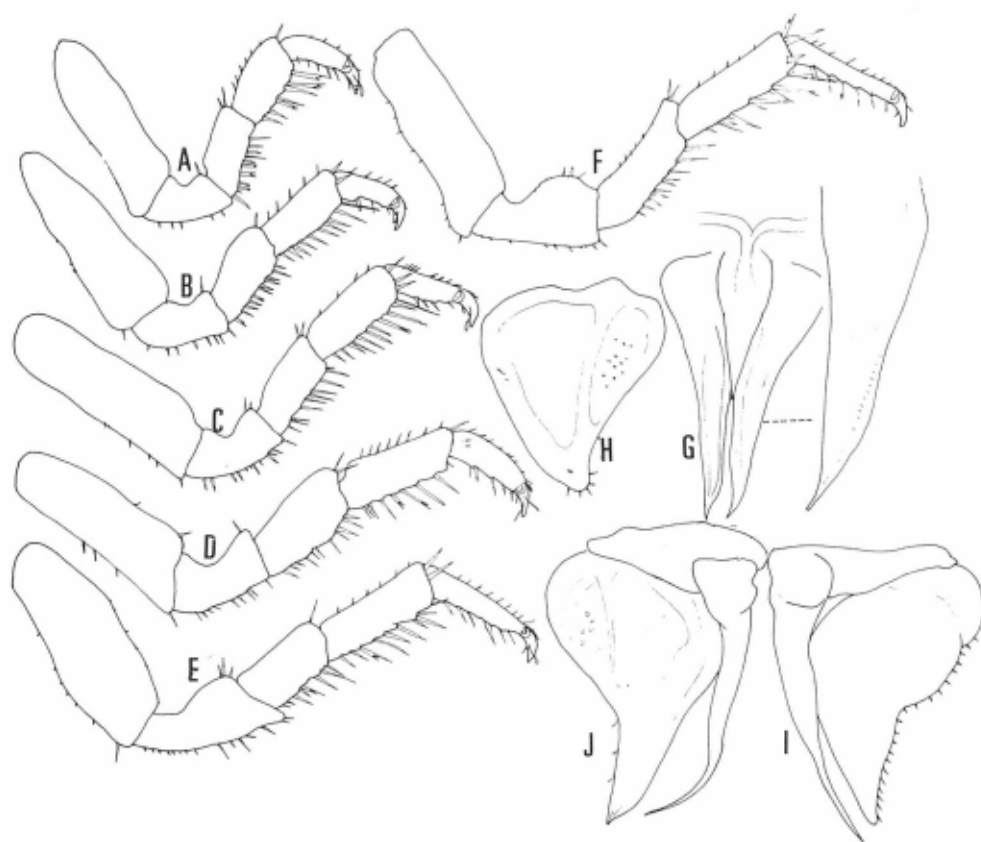


Fig. 47. *Alloniscus boninensis*, n. sp.

A-D. First to fourth peraeopods ; E-F. Sixth and seventh peraeopods ; H. Exopodite of male first peraeopod ; G. Penes and endopodite of male first peraeopod ; I and J. Male second pleopod (A-F, J : Paratype male, G-I : Holotype male).

***Alloniscus tsushimaensis*, n. sp.**

(Jap. name : Tsushima-tama-warajimushi, new)

Fig. 48

Material examined : 2 ♀♀ (1 ♀ holotype, 9.2 mm in body length and 1 ♀ paratype, 5.6 mm in body length), between Shitaru and Ina, Kamiagata-chô, Kamiagata-gun, Tsushima Island, Nagasaki Pref., coll. Yoshiaki Nishikawa, July 25, 1970. Type series is deposited as follows : holotype (TOYA-Cr-2303) at the Toyama Science Museum, 1 paratype (OMNH-Ar-2910) at the Osaka Museum of Natural History.

Description : Body oblong, 2.2 times as long as broad. Body colour yellowish green in alcohol. Mutual length of pereopodal somites subequal. Postero-lateral angles of first to fourth somite rectangular but those of fifth to seventh acutely protruded posteriorly. Eyes mediocre, each composed of 20~22 ocelli. Posterior margin of pleotelson round. Cephalon round with a low rostral projection and a pair of truncate antro-lateral angles.

First antenna (Fig. 48 B) ; first segment almost square ; second segment rather short ; third segment oblong with 5 aesthetascs.

Second antenna (Fig. 48 C) reaching the posterior part of second pereopodal somite ; first segment short with a rather big scale like structure ; second segment triangular ; third segment rectangular ; fourth segment 1.7 times as long as the third ; fifth segment 1.8 times as long as the fourth. Flagellum 3-segmented ; mutual length is 5 : 4 : 8.

Right mandible (Fig. 48 D) ; pars incisiva composed of 3 teeth ; lacinia mobilis not chitinized and 2-headed ; a hairy seta behind lacinia mobilis ; processus molaris represented by a small process bearing 6~7 plumose setae.

Left mandible (Fig. 48 E) ; pars incisiva composed of 3 teeth ; lacinia mobilis strong and 3-headed ; a hairy bristle between lacinia mobilis and processus molaris ; processus molaris like that of right mandible.

First maxilla (Fig. 48 F) with 8~9 entire teeth at the tip.

Second maxilla (Fig. 48 G) dividing into 2 lappets by a shallow incision.

Maxilliped (Fig. 48 H) ; endite rectangular with many setae on distal margin.

Palp triangular ; basal segment short with 2 stout setae, remaining part with a relatively oblique suture.

First pereopod (Fig. 48 I) a little shorter than the succeeding ones ; basis oblong ; ischium, merus and carpus rectangular and subequal in shape ; propodus rather short and slightly curves inwards with a group of small setae in basal inner margin.

Second to seventh pereopods (Fig. 48 J-K) subequal in shape ; basis oblong ; ischium rectangular ; merus about two-thirds the length of ischium ; carpus a little longer than merus ; propodus slender.

Remarks : The present new species resembles closely *Alloniscus balssi* from Honshu and Kyushu, but the former is separated from the latter in the following features : (1) longer body shape, (2) paler colour of dorsal surface, (3) less numerous but longer teeth on outer lobe of

first maxilla. Regrettably no male specimen has been collected.

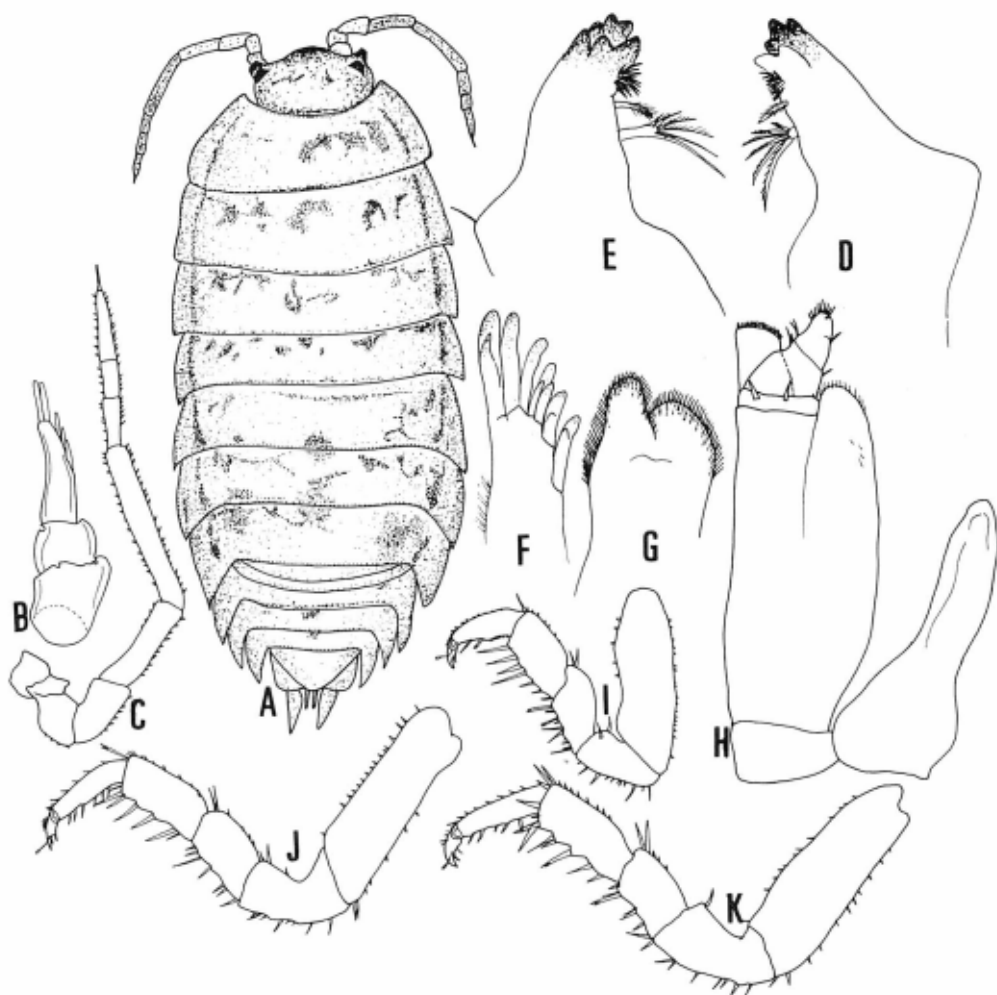


Fig. 48. *Alloniscus tsushimaensis*, n. sp.

A. Dorsal view; B. First antenna; C. Second antenna; D. Right mandible; E. Left mandible; F. Outer lobe of first maxilla; G. Second maxilla; H. Maxilliped; I. First pereopod; J. Sixth pereopod; K. Seventh pereopod (A-C, I-K: Holotype female; D-H: Paratype female).

***Alloniscus ryukyuensis*, n. sp.**

(Jap. name: Ryukyu-tama-warajimushi, new)

Figs. 49 to 51

Material examined: 10 ♂♂ (1 ♂ holotype, 6.0 mm in body length and 9 ♂♂ paratypes,

5.0~6.9 mm in body length) and 10 ♀♀ (1 ♀ allotype, 6.1 mm in body length and 9 ♀♀ paratypes, 4.2 mm~6.9 mm in body length, Sokoji, Ishigaki Island, Yaeyama Islands, Okinawa Pref., Okinawa Pref., coll. Noboru Nunomura, June, 25, 1975; 4 exs, Yonehara, Ishigaki Island, Yaeyama Islands, Okinawa Pref., coll. Yasuhiko Shibata, May, 8, 1975; 1 ♀, Kohama Island, Yaeyama Islands, Okinawa Pref., coll. Moritaka Nishihira, May 30, 1975; 4 exs, Toyohara, Iriomote-Island, Yaeyama Islands, coll. Satoru Tanaka, July 21, 1976; 10 exs, Funaura, Iriomote Island, Yaeyama Islands, Okinawa Pref., coll. Noboru Nunomura, June, 22, 1975; 8 exs, Sumiyoshi, Iriomote Island, Yaeyama Islands, Okinawa Pref., coll. Noboru Nunomura, June 21, 1975; 7 exs, Taketomi Island, Yaeyama Islands, Okinawa Pref., coll. Noboru Nunomura, June 23, 1975; 6 exs, Minna Island, Okinawa Pref., coll. Hiroshi, Hoshikawa, June, 1980; 19 exs, Sarahama, Irabu Island, Miyako Islands, Okinawa Pref., coll. Noboru Nunomura June 21, 1975 9 exs, Painagama-Beach Hirara City, Miyako Island, Okinawa Pref., June 26, 1975; 1 ex, Karimata, Hirara City, Miyako Island, Okinawa Pref., coll. Noboru Nunomura, June 28, 1975; 8 exs, Sena-misaki, Nago City, Okinawa Island, Okinawa Pref., coll. Noboru Nunomura, Mar. 26, 1977; 3 exs, Komesu, Itoman City, Okinawa Island, Okinawa Pref., coll. Hiroshi Hoshikawa, May, 10, 1980; Type series is deposited as follows: holotype (TOYA-Cr-2533), allotype (TOYA-Cr-2534) and 16 paratypes (TOYA-Cr-2535~2550) at the Toyama Science Museum, 4 paratypes (OMNH-Ar-2916~2919) at the Osaka Museum of Natural History; 4 paratypes (YCM-CI-865~868) at the Yokosuka City Museum and 4 paratype (NSMT-Cr-8975) at the National Science Museum, Tokyo.

Description: Body oval, 1.9 times as long as wide. Body colour pale yellow with dark irregular patterns. Body surface with many minute granules. Eyes rather large, each with 22 ocelli. Cephalon round and with small triangular tubercles at the anterolateral corners. First peraeonal somite a little longer than the other segments, and other segments subequal in length. Pleotelson wide but short.

First antenna (Fig. 51 A) small and 3-segmented; first segment rectangular with a projection at distal corner second segment square with a projection at distal corner; terminal segment rectangular with 5 aesthetascs at the tip.

Second antenna (Fig. 51 B) reaching the anterior margin of the second peraeonal somite; first segment square; second segment rectangular; third segment a little longer than the second; fourth segment 1.2 times as long as the third; fifth segment narrow and 1.5 times as long as wide. Flagellum composed of 3 segments, second segment a little shorter than the other. Each segment of second antenna bears many spines.

Right mandible (Fig. 49 B); pars incisiva composed of 3 teeth; lacinia mobilis not chitinized, composed of a single tooth; a hairy bristle behind lacinia mobilis; processus molaris represented by a single process bearing 6~7 plumose setae.

Left mandible (Fig. 49 C); pars incisiva stout and composed of 2 teeth, inner one is solitary, but the another is stout and slightly 2-headed; lacinia mobilis also strong and composed of 2~3 stout setae; 2 hairy bristles behind lacinia mobilis; processus molaris represented

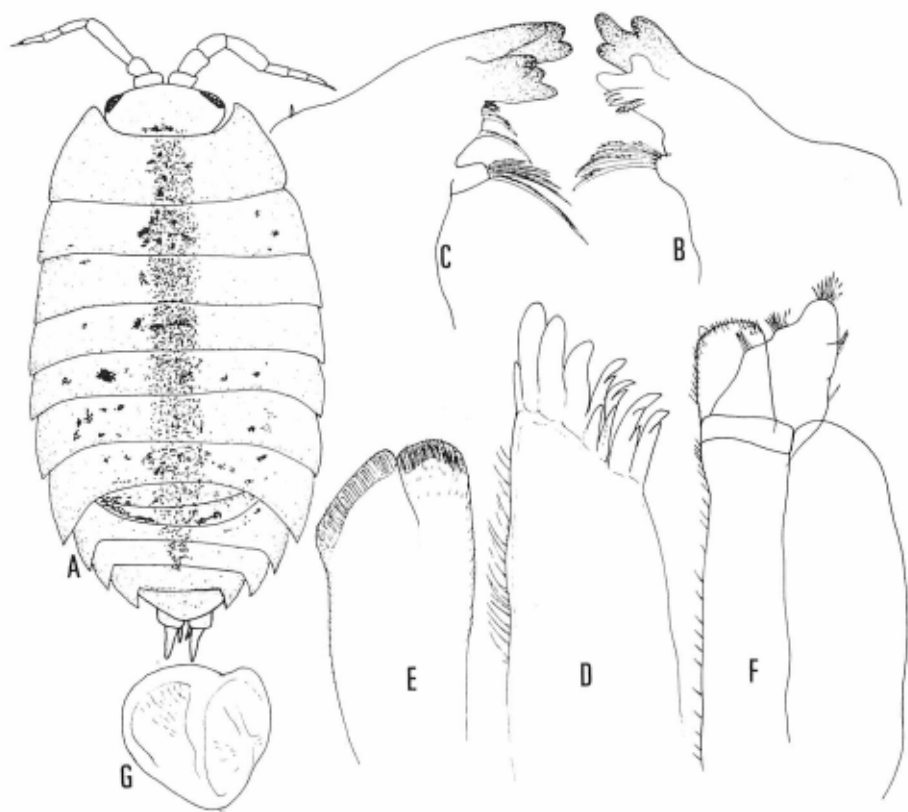


Fig. 49. *Alloniscus ryukyensis*, n. sp.

A. Dorsal view; B. Right mandible; C. Left mandible; D. Outer lobe of first maxilla; E. Second maxilla; F. Maxilliped; G. Exopodite of male first pleopod (A and G: Paratype male; B-F: Holotype male).

by a process bearing 6~7 plumose setae.

First maxilla (Fig. 49 D); outer lobe with 10 teeth at the tip; inner lobe short, with 2 hairy bristles at the tip.

Second maxilla (Fig. 49 E) divided slightly into 2 lappets.

Maxilliped (Fig. 49 F); endite rectangular; palp triangular; epipodite ellipsoid.

All the pereopods (Fig. 50 A-G) almost similar in shape but increasing posteriorly in length; basis oblong with a sharp seta at inner-distal corner and with 10~20 spines on inner margin; ischium rectangular, with 1~6 relatively long setae on outer margin; and several setae on inner margin; murus rectangular with a series of long setae on inner margin and 2~3 setae at outer-distal corner; carpus rectangular and almost as long as merus, with a series of many long setae on inner margin and a few of setae on distal margin; propodus slender

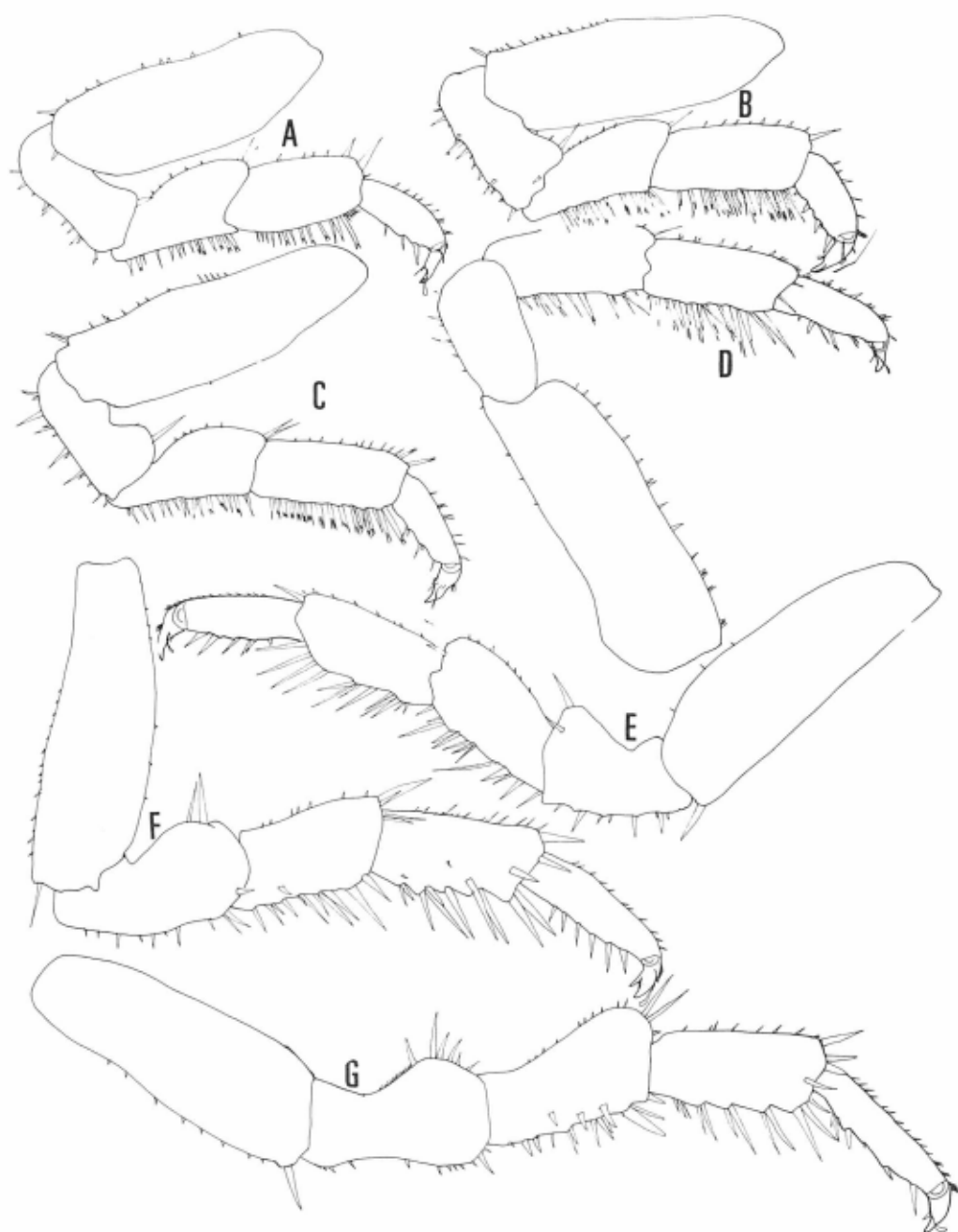


Fig. 50. *Alloniscus ryukyuensis*, n. sp.

A-G : First to seventh pereopods (All : Holotype male).

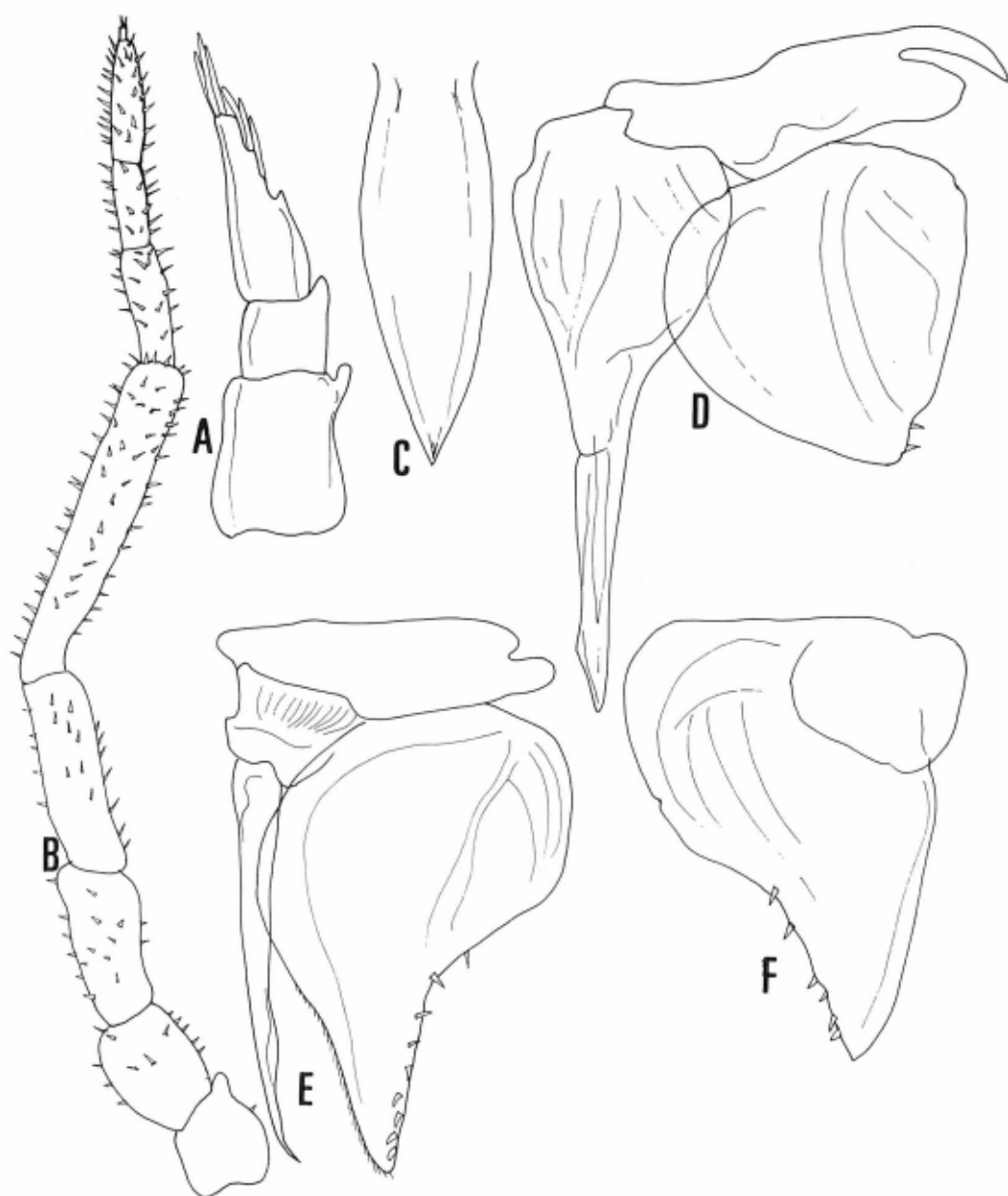


Fig. 51. *Alloniscus ryukyensis*, n. sp.

A. First antenna ; B. Second antenna ; C. Penes ; D. Male first pleopod ;
E. Male second pleopod ; F. Third pleopod (All : Holotype male).

with several setae on inner margin and a series of spine on distal margin; dactylus with a group of short setae on outer basal part.

Penes (Fig. 51 C) fusiform.

Male first pleopod (Fig. 49 G & 51 D); exopodite roundly triangular with 1~2 spines at the tip; endopodite with straight apical part.

Male second pleopod (Fig. 51 E); stylus as long as the exopodite and slightly recurving outerwards; exopodite triangular with a series of small hair on inner margin and a shallow concavity and about 9 spines in outer border.

Third to fifth pleopods (Fig. 51 F) normal.

Uropod rather slender.

Remarks: The present new species is separated from *Alloniscus balssi*, from Honshu and Kyushu, in the following features: (1) yellowish body colour, (2) shorter body shape, (3) round exopodite of first pleopod in male.

The new species seems to be contain variation types in colour patterns; yellowish specimens were collected mainly from Yaeyama Island (type locality) but their frequency was low in Miyako and Okinawa Islands. On the other hand, blackish individuals were collected from Okinawa Island but the ratio of blackish individuals were low in Yaeyama Islands and Miyako Islands, especially in the former Islands. Individuals of both types were, however, collected together at the same localities on many occasions.

***Alloniscus maculatus*, n. sp.**

(Jap. name: Madara-tama-warajimushi, new)

Figs. 52 and 53

Material examined: 2 ♂♂ (1 ♂ holotype, 7.2 mm in body length, 1 ♂ paratype, 3.3 mm in body length) and 11 ♀♀ (1 ♀ allotype 4.4 mm in body length and 10 ♀♀ paratypes, 2.7~3.8 mm in body length), Hikawa, Yonakuni Island, Okinawa Pref., coll. Hiroshi Harada, June, 28, 1978. Type series is deposited as follows: holotype (TOYA-Cr-2837), allotype (TOYA-Cr-2838) and 5 paratypes (TOYA-Cr-2839~2843) at the Toyama Science Museum, 2 paratypes (OMNH-Ar-2927~2928) at the Osaka Museum of Natural History, 2 paratypes (NSMT-Cr-8980) at the National Science Museum, Tokyo, and 2 paratypes (YCM-CI-876~877) at the Yokosuka City Museum.

Description: Body oval about 1.9 times as long as wide. Body colour yellow with brownish irregular patterns on dorsal surface. Eyes rather small, each composed of 14 ocelli. Mutual length of paraeonal somites subequal in length. Cephalon with a small rostral projection and small lateral projections. Pleotelson triangular.

First antenna (Fig. 53 A) short; first segment stout; second segment short; terminal segment rectangular with 4 aesthetascs and a setae.

Second antenna (Fig. 53 B) reaching the second paraeonal somite; first segment small; second segment and third segment rectangular; fourth segment a little longer than the third;

fifth segment 1.5 times longer than the fourth. Flagellum 3-segmented; terminal segment a little longer than the basal two segments.

Right mandible (Fig. 52 B); pars incisiva composed of two teeth; lacinia mobilis not chitinized with 4 teeth; a hairy bristle behind lacinia mobilis; processus molaris represented by a tuft of setae on a common base.

Left mandible (Fig. 52 C); pars incisiva composed of 3 teeth; lacinia mobilis composed of a single tooth, a hairy bristle behind lacinia mobilis; processus molaris like that of right mandible.

First maxilla (Fig. 52 D); outer lobe with 10 teeth at the tip.

Second maxilla (Fig. 52 E) weakly bilobed.

Maxilliped (Fig. 52 F) epipodite elongated; endite truncated with 12~14 setae; palp rather straight and short.

First peraeopod (Fig. 53 C) shorter than the other ones; basis oblong with many setae on inner margin; ischium rectangular; merus rectangular with more than a dozen bifid setae; carpus rectangular with about a dozen bifid setae on inner margin; propodus with 2~3 bifid setae and several simple setae on inner margin.

Second to fourth peraeopods subequal (Fig. 53 D-F); basis oblong with several short setae; ischium rectangular with 2~3 setae and about a dozen simple setae; merus as long as ischium with 6~12 bifid setae and several simple setae on inner margin; carpus a little longer than merus with about 15 bifid setae on inner margin; propodus with 2 bifid setae on inner margin and about 6 simple setae on inner margin.

Fifth and sixth peraeopods (Fig. 53 G-H) subequal in shape; basis oblong with a seta and black round patterns on the central part; ischium rectangular with 5~6 setae on inner margin and 2~3 setae at outer-distal corner; merus rectangular with about 10 setae on inner margin and 3~4 setae on distal margin; propodus relatively long with 5~6 setae on inner margin and 5~6 setae on outer margin; dactylus rather short.

Seventh peraeopod (Fig. 53 I) almost similar to the sixth peraeopod but propodus of this leg longer than that of the preceding one, and without black pattern.

Penes (Fig. 52 G) elliptical.

Male first pleopod (Fig. 52 H); exopodite round; endopodite rather stout and only apical part recurving outwards.

Male second pleopod (Fig. 52 I); stylus slender and terminates a thin tip; exopodite triangular with narrow tip.

Uropod; basis stout; exopodite tapering towards the tip and slightly exceeding beyond the endopodite endopodite narrow.

Habitat: The present specimens were collected from the evergreen forests such as *Hibiscus tiliaceus* and *Pongamia pinnata*.

Remarks: The present new species is most closely allied to *Alloniscus ryukyuensis* described in this paper, but the former is separated from the latter in the following features:

(1) presence of black patterns on the basis of fifth and sixth pereopods, (2) remarkable bifid setae on pereopod, (3) shape of pleotelson, (4) shape of male first and second pleopod.

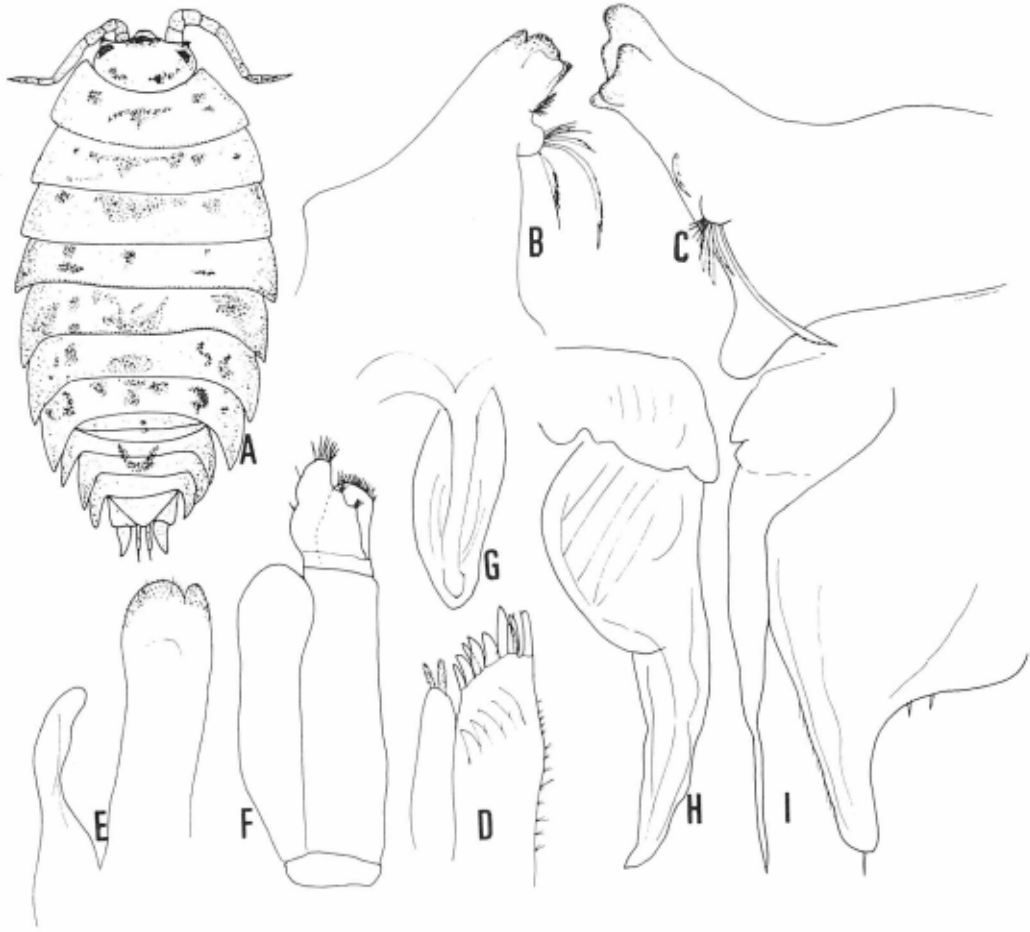


Fig. 52. *Alloniscus maculatus*, n. sp.

A. Dorsal view ; B. Right mandible ; C. Left mandible ; D. First maxilla E. Second maxilla ; F. Maxilliped ; G. Penis ; H. Endopodite of male first pleopod ; I. Male second pleopod (All : Holotype male).

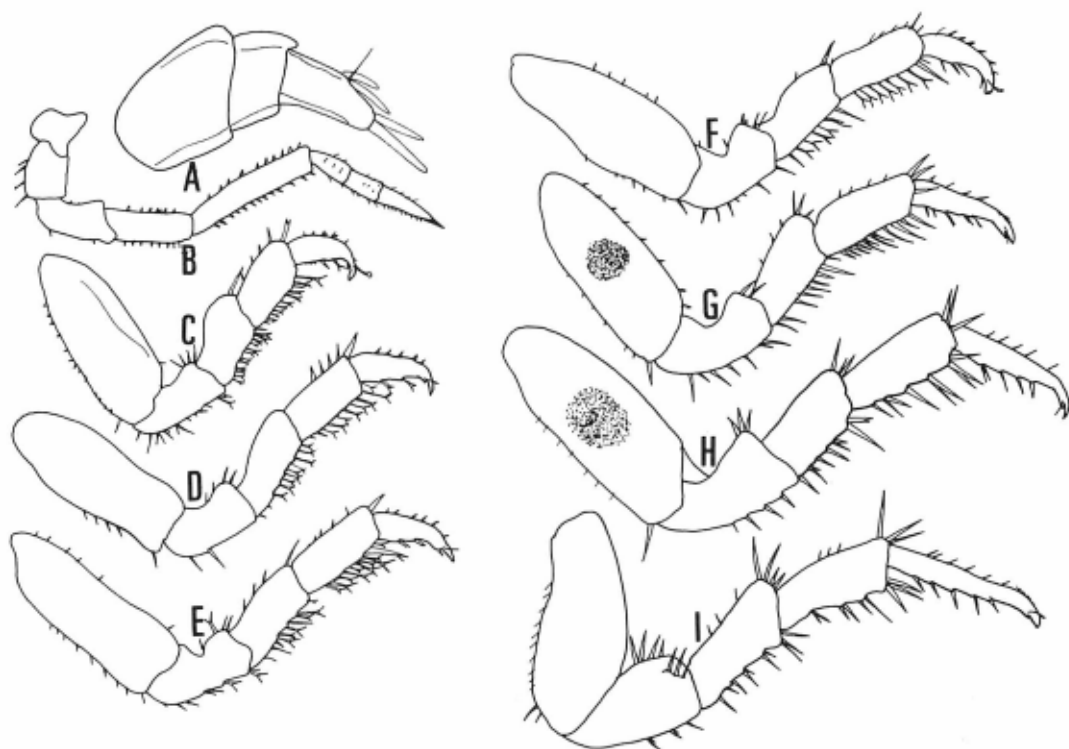


Fig. 53. *Alloniscus maculatus*, n. sp.

A. First antenna; B. Second antenna; C-I. First to seventh pereopod.
(All: Holotype male).

***Alloniscus* sp.**

Fig. 54

Material examined: 2 exs, Uotsuri-Island, Senkaku Islands, Okinawa Pref., coll. Takuya Abe, May 30, 1979. These specimens are deposited at the Toyama Science Museum (TOYA-Cr-2376~2377).

Description: Body oval and convex, 1.9 times as long as wide. Body colour pale yellow with irregular black patterns sparsely. Cephalon with a low rostral projection and small anterolateral angles. Eyes mediocre each with 23~24 ocelli. Mutual length of pereopodal somite subequal. Pleotelson round and small.

First antenna (Fig. 54 B) small and slender; first segment rectangular with a small protuberance on outer margin; second segment square and a projection at the tip; third segment oblong with 2 aesthetascs at the tip and 2 aesthetascs on the middle part.

Second antenna (Fig. 54 C) reaching the middle part of the second peraeonal somite ; first segment short ; second segment about twice as long as the first ; third segment as long as the second ; fourth 1.5 times as long as the third ; fifth segment again 1.5 times as long as the fourth. Flagellum 1.3 times as long as the fifth peduncular segment, and composed of 3

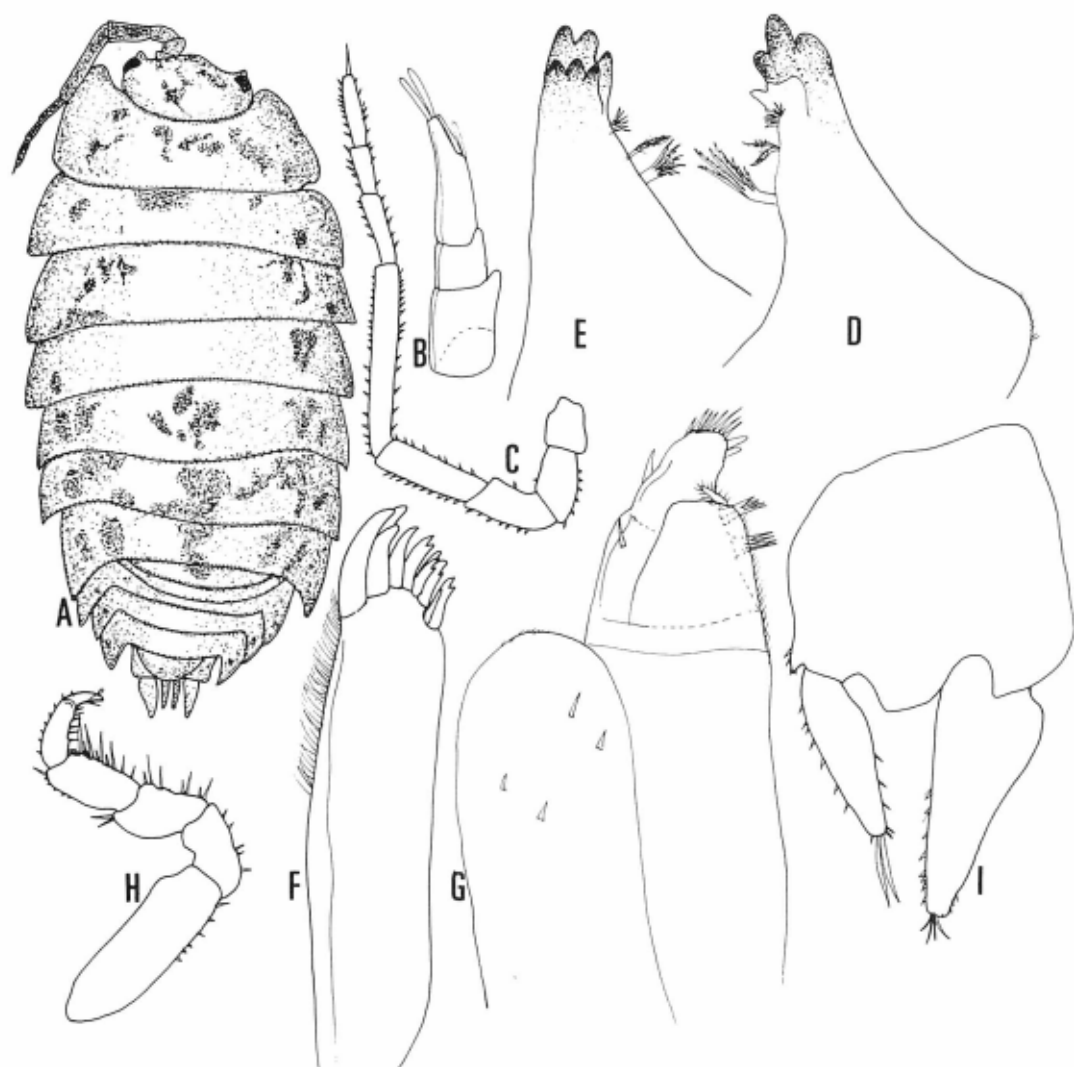


Fig. 54. *Alloniscus* sp.

A. Dorsal view ; B. First antenna ; C. Second antenna ; D. Right mandible ; E. Left mandible ; F. Outer lobe of first maxilla ; G. Maxilliped ; H. First peraeopod ; I. Uropod (All : Female specimens).



Fig. 55. Map showing the geographical distribution of the genus *Alloniscus*.

subequal segments.

Right mandible (Fig. 54 D); pars incisiva stout; composed of 3 teeth; lacinia mobilis thin and composed of 6 teeth; 2 hairy bristles between lacinia mobilis and processus molaris; processus molaris represented by a single process bearing a tuft of plumose setae.

Left mandible (Fig. 54 E); pars incisiva stout, composed of 3 teeth, lacinia mobilis chitinized and 3-headed; a hairy bristles between lacinia mobilis and processus molaris; processus molaris like that of right mandible.

First maxilla (Fig. 54 F); outer lobe with 10 teeth at the tip; inner lobe with 2 hairy bristles at the tip.

Maxilliped (Fig. 54 G); palp rather short and with a indistinct suture in the middle part; endite stout with a robust seta at the tip.

All the paraeopods (Fig. 54 H) subequal in shape; basis oblong; ischium rectangular with a series of sparse setae on inner margin; merus as long as ischium and with a series of setae on inner margin; carpus almost as long as merus with a series several longer setae and several shorter setae on inner margin and 5~6 spines and a seta on outer margin; propodus with a series of setae on inner margin and a series of spines on outer margin.

Uropod (Fig. 54 I); basis almost square with a sinuate posterior margin; endopodite fusiform with 2 relatively long setae at the tip; exopodite stouter and longer than the endopodite, with 4 setae at the tip.

Remarks: The present specimens seem to be most closely allied to *Alloniscus ryukyuensis* previously described in this paper, but some differences are found: the former is distinguished from the latter by (1) shape of maxilliped, (2) shape of pleotelson, (3) less numerous setae on paraeopods, (4) shape of first antenna, and (5) shape of uropod. The examination was limited to two incomplete female specimens only and no male specimen was obtained, therefore, the specific name could not be determined.

Corrections

In the previous paper, Part I. Taxonomy of the Families Ligiidae, Trichoniscidae and Olbrinidae, some serious mistakes were slipped in:

p.24, 1.5 and p.54, 1.1, for "*Hyloniscus cornutus*" read "*Hyloniscus cornutus*"

p.52, 1.21, for "*Hyloniscus unidentus*" read "*Hyloniscus unidentatus*"

p.59, 1.7, for "*Hondoniscus kilamiensis*" read "*Hondoniscus kitakamiensis*"

p.44, 1.2, for "*lacinia mobilis chitinized*" read "*lacinia mobilis not chitinized*"

I proposed a new Japanese name "Ueno-hora-warajimushi" to *Hyloniscus uenoi* VANDEL, but recently I knew that Japanese name "Awa-mekura-warajimushi" had already been proposed and used by Japanese speleogists.

I wish to apologize for and to correct these mistakes.